





Trends and Strategies in Logistics and Supply Chain Management

Embracing Global Logistics Complexity to Drive Market Advantage

Robert Handfield
Frank Straube
Hans-Christian Pfohl
Andreas Wieland



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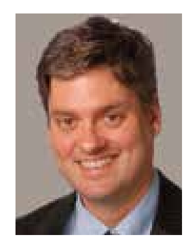
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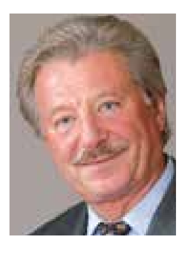
Overall Scientific Supervision



Professor Robert Handfield, PhD
Bank of America Distinguished Professor,
Director, Supply Chain Resource Cooperative
Poole College of Management,
North Carolina State University,
Raleigh, North Carolina, USA



Professor Dr.-Ing. Frank Straube
Director Department of Technology
and Management,
Chair of Logistics,
Technische Universität Berlin,
Berlin, Germany



Professor Dr. Dr. h.c. Hans-Christian Pfohl
Head of the Supply Chain and
Network Management Group,
Technische Universität Darmstadt,
Darmstadt, Germany



Dr. Andreas Wieland
Manager of the Center for International
Logistics Networks (funded by the Kühne
Foundation) at the Chair of Logistics,
Technische Universität Berlin,
Berlin, Germany

International Partners

Haozhe Chen, Ph.D.
Assistant Professor in Marketing and Supply Chain Management,
Research Fellow, College of Business,
East Carolina University,
Greenville, North Carolina, USA

Cesar Lavalle
Director, International Relations & Forums,
ILOS – Instituto de Logística e Supply Chain,
Rio de Janeiro, Brazil

Dr. Meng Lu
Program Manager International,
Dutch Institute for Advanced Logistics,
Breda, The Netherlands

Jos Marinus
President of the Board,
European Logistics Association,
Brussels, Belgium

Professor Paulo Resende
Dean, Research & Development and Degree Programs,
Professor and Researcher of Logistics Fundação Dom Cabral,
Sao Paulo, Brazil

Professor Victor Sergeev
Higher School of Economics,
National Logistics Association,
Moscow, Russia

Professor Dr. Sidong Zhang
Head of the Kühne Foundation Chair for International Logistics
Networks and Services,
Chinese-German School of Postgraduate Study (CDHK),
Tongji University,
Shanghai, China

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A Tradition of Research Insights in Logistics

Over 20 years ago BVL initiated an effort to conduct research on logistics trends, and their impact on the global logistics environment. Over time, this study became an increasingly reliable source of information for the review of current planning priorities, future strategic plans, benchmarking, gap analysis, and a basis for dialogue and discussion in the logistics community.

As Germany's logistics sector expanded globally, the study has once again continued to expand its boundaries to consider global trends and strategies that fall outside the European Union boundaries. Organizations today are expanding their reach into North America, South America, Asia, Eastern Europe and Africa. At the same time, new e-commerce channels have emerged, omni-channel customer requirements have developed, the technological landscape has shifted, and regulatory controls have continually increased. With this growth in the complexity of global logistics, BVL has assembled a global team to undertake this current study on trends and strategies in the logistics sector.

The title of the new study, Embracing Global Logistics Complexity to Drive Market Advantage, reflects the core themes we found in the study. The results point to the fact that leading companies are embracing the complexity associated with their growing logistics boundaries, and are deploying strategies designed to monitor, respond, and manage this complexity. These insights were derived by a survey using responses from 1757 individuals. The survey was translated into English, German, Portuguese, Russian, and Chinese, and run with the cooperation of the leading logistics and supply chain organizations in the world. The results were analyzed, and combined with interviews from over 60 senior logistics and supply chain executives at global organizations in India, the U.S., China, Germany, France, the UK, the Netherlands, and Brazil.

Together, these results provide a compelling set of insights that we believe you will find to be fascinating, and which we are sure will drive engaging dialogue and discussion amongst you and your logistics colleagues and leaders.

We would like to thank our international research partners and BVL International for their cooperation in this major endeavor. We would also like to thank BASF for supporting this study and the European Logistics Association for their assistance.

As always, we look for your comments, insights, and feedback to this study, and are hopeful you will put them to good use as you build your global logistics strategy.

Prof. Robert Handfield, PhD
Prof. Dr.-Ing. Frank Straube
Prof. Dr. Dr. h.c. Hans-Christian Pfohl
Dr. Andreas Wieland

Executive Summary

The key results of this study on trends and strategies in logistics and supply chain management are summarized, as follows. They are based on 1757 responses collected in an international survey from supply chain executives (including logistics service providers (LSPs), retailers, and manufacturing companies).

Key Trends

The general observation from both the interviews and the study results is that logistics complexity in the form of fragmented channels, increased product variations, and consumer demands for customized solutions has increased. Several trends demonstrate that a number of major challenges lie ahead, as the world becomes a more complex place to operate logistically.

Customer expectations: In essence, logistics and supply chain management should primarily enable a company to satisfy its customers' needs. Increasing customer expectations were ranked by respondents of our study as the most important trend, and meeting customer requirements has been ranked by more than 20% of the respondents as the number-one logistics objective. But, as customers are becoming ever more demanding and critical, traditional measures often fail when pursuing strategies to satisfy customers.

Networked economy: In the past, companies have typically considered themselves to be independent players in the market and, at best, managed interfaces to direct suppliers and customers. In today's networked economies, this is just not enough anymore. Companies are often forced to collaborate with partners both vertically and horizontally in their extended supply chain network, and these partners expect them to integrate their processes and systems. Companies are forced to adopt network thinking rather than company thinking.

Cost pressure: Customers continue to expect low costs. Although other requirements such as sustainability, social issues or risk-mitigation capabilities are increasingly discussed in the media, cost pressure seems to remain the ultimate criterion for customers. Given the trend towards increased customer expectations, it has become ever more difficult to reduce costs any further. Logistics costs are playing an important role in reducing overall costs. Logistics costs share of overall revenue is as low as 4% and 6% in the electronics and automotive industries, respectively. However, our results show that costs are on the rise (larger than 8% on average for manufacturing industries). A concerning result is that as many as 14% of the respondents cannot estimate their logistics costs.

Globalization: As global footprints expand, logistics performance as measured by delivery reliability has deteriorated, due to increasing customer requirements, greater volatility, and problems with infrastructure. Two out of three respondents stated that their company's logistics capability is negatively influenced by poor transportation infrastructure, which is a problem particularly in emerging markets. In sum, globalization clearly amplifies other trends and leads to an increase in complexity, particularly in regions of growth such as Russia, Eastern Europe, India, and Africa.

Talent shortfalls: Across all regions and sectors, talent shortages in logistics is considered one of the most important challenges in the coming years. Shortages are being seen at both the operational level as well as the planning and controlling function. In particular, about 70% of the respondents experience a shortage of skilled labor. The most important strategies to cope with talent shortage are training and qualification programs and strategic cooperation with universities and research institutions. In the United States and Europe, talent shortages are also a function of demographics. In emerging nations strong competition from other fields like finance, strategy and IT contributes to the talent shortage.

Volatility: In the last years, market turbulence on the supply and demand side has increased. This was amplified by the economic and financial crisis, which demonstrated how fluctuations in one part of the world can build up to dramatic problems in other parts of the world. Respondents of this study believe that volatility will continue to increase and more than 50% of them consider it to be a very important trend in five years.

Sustainability pressure: This trend has emerged as a very serious topic. Already more than 55% of the respondents stated that green issues are part of their logistics strategy. Corporate social responsibility has also emerged as a highlight for debate. However, there remains a great deal of uncertainty in the deployment of these strategies, especially relative to measurement systems, evaluation and setting goals and strategies for logistics sustainability.

Increased risk and disruption: The majority of companies (irrespective of size, sector, country and position in the supply chain) consider the mitigation of internal and external risks essential. Strategies for

managing risk around demand and planning are also considered important. Executives concur that strategic frameworks and tools are needed for engaging the entire network in the management of risk and disruptions. Solutions focused on improving transparency of tier two suppliers, inventory and demand impede mitigation and force companies into reactive strategies. Proactive strategies should include research and development, procurement, production and sales.

New technology: The majority of companies are recognizing the growing need for investments in new technology, with about 60% of the respondents planning to invest in “big data” analysis tools within the next five years. Those tools seek to develop capabilities around the comprehensive handling and intelligent connection of data to increase planning and control outcomes. The new wave of decentralized automated network technologies are in their infancy. Predictions from the last study concerning the use of those technologies have not yet materialized.

Key Strategies

How should organizations prepare themselves to deal with these emerging trends? Top performing companies in our research are not only preparing themselves for these challenges, but are seeking to exploit these elements for advantage. Poor performers fail to do so. Customers see themselves as part of a global network; the winners are those with the best relationships with the best players. This is true not only for vertical relationships with suppliers, but also fo horizontal relationships with other companies. It is not sufficient anymore to think in terms of one’s own sphere, but the unit of competition is now the network. In this summary we present some key insights based on what these top-performing companies from different sectors are doing differently and we present the following checklist for your own logistics and supply chain network.

First, top performers are prioritizing talent management as a priority for growth. They are seeking to hire, retain, and incent individuals with strong analytical and team-building skills, emphasizing communication, agile decision-making, and an ability to work in a multi-cultural setting (PEOPLE). Second, top performers have constructed a global governance process that holds people to a standard of conduct and behavior, emphasizing integrated planning but with enough room to maneuver around regional issues that confront their global business unit (PROCESS). Process standards ensure that there is a global set of policies and procedures that drives the right outcomes, but also emphasizes that plans must be properly aligned throughout the supply chain. Third, they have developed long-term technology roadmaps that are aligned with core strategic initiatives and customer expectations. Technology roadmaps seek to drive better capabilities to price products and services effectively and establish services that meet or exceed customer expectations (TECHNOLOGY). Investments in technology are made with the intent of allowing people to make better decisions in an integrated manner, and are always considered in light of customer outcomes. Fourth, leading performers have established a precedent for creating network partnerships, outsourced relationships, and bundled products and services with key global partners, resulting in improved set of capabilities that are extremely difficult to replicate (NETWORK). Organizations recognize that they cannot “do it alone”, but that those with the most capable network of suppliers and logistics partners will win in the end. This requires defining a culture that builds trust and cooperation in global relationships, which takes time to achieve. Finally, top performers have established a commitment to improving the global community, with a plan to leave it in a better condition than when they arrived, both in terms of carbon footprint and global standards (COMMUNITY). By investing in green logistics and emphasizing labor and human rights, these organizations will reap the rewards of these investments in the years to come. Each of these strategies (PEOPLE, PROCESS, TECHNOLOGY, NETWORK, and COMMUNITY) are next described.

PEOPLE. Organizations must be able to quickly adjust and shift direction in response to sudden changes in a complex environment. A responsive organizational culture relies at its foundation on a highly capable and trained workforce. People are the core of any organization, and top performers have established a commitment to talent management. The goal of talent management is to ensure people are enabled and capable of making decisions in response to difficult and unstructured types of situations.

Low performers are more likely to perceive that talent shortfalls will be a major challenge in the years ahead overall. Top performers are less concerned about talent shortages in specific areas of expertise than non-top performers. This is because their supply chain organization is partnering with human resources to build a talent management strategy, explicitly measuring talent gaps, and establishing organizational actions to address them. One of the strategies that is important here is collaborating with universities on joint research, establishing a presence on university campuses, and building a pipeline of new talent. A second approach is to educate people more about logistics as a career, and to “market” logistics as an exciting and growing career for young managers and students. A third approach involves mentoring and developing internal talent to work in logistics, including recruiting

top talent from other areas in the organization. A final element is further investing in training and education for high potential employees to develop them and build loyalty to your organization, as well as to promote people to different roles that will challenge them. This is particularly important for young managers who seek a challenging global career in logistics.

PROCESS. As organizations grow, they need to have a strong core set of policies, procedures, processes and culture upon which to build. But these core processes must be able to fit any global situation or culture, which means that there needs to be room to flex. Organizations promote people who can understand your culture through shadowing, mentoring, and plenty of training and education opportunities. Not only will this improve retention but it will grow capabilities, and allow innovation and new ways of working to flourish in your global network.

To establish a global process that can adapt to different local regulatory, cultural, and network conditions means having the right type of decision-maker that can operate within the context of a process. An important finding from our research is that top performing firms indicated that they prefer to hire and recruit individuals who have a strong rational and analytical foundation. These individuals are able to use data to define environmental conditions, and act on their logical interpretation of this data. Top performers also seek managers who can consider the long-term impact of their decisions, not just the immediate situation in front of them. Top performing companies also prefer specialists who have deep knowledge in a specific area, and thus have the experience to assess the situation. Finally, top performers want individuals who have agility to work in unfamiliar global environments as well as individuals who are prepared to work in a global setting (often with multiple language capabilities when possible). To find and develop these skills requires a focused approach to talent development.

This is a unique combination to find in logistics managers, but aligns well with our previous observation of having individuals who can quickly grasp the dynamics of a specific logistics situation, apply analysis and rational thinking to the situation, and emerge with a clear solution that considers the long-term implications of the outcome. As organizations expand globally, the need for a global perspective is also important, and this is increasingly harder to find. This represents a "tall order" for human resource specialists to identify and recruit these types of individuals, and emphasizes the importance of casting a wide net across multiple channels to identify them.

It is interesting to note that an important difference between top performing companies is that they are more likely to be a stand-alone logistics organization and less likely to be part of the procurement organization. This independence establishes logistics as a critical global process with its own governance, but one that is aligned with business needs. Although procurement has often considered logistics as "simply a buying activity", there is a clear need to differentiate the types of logistics issues that require a distinct approach. We are much more likely to see closer coordination between procurement and logistics in these organizations, with logistics often playing a "consultative" role in defining solutions for procurement and for business units alike.

TECHNOLOGY. Leading organizations are recognizing that to enable people, technology must be leveraged to provide insights, visibility, and promote an action-oriented culture. Respondents expect 30% growth in new technology investments in RFID, inventory optimization software, as well as in analytics and big data technologies. Technology investments that have a direct tie to user requirements, customer responsiveness, and accountability for results have the best promise of being adopted successfully.

Top performers are investing in a solid basis of robust logistics and supply chain data, through ensuring that their data systems can track events, transactions, and form a strong data-based analytics foundation (ERP, 2D barcode). Such technologies will become the foundation for network optimization, global material visibility, and end-to-end integration. As multiple parties across the extended global supply chain have access to the same "sheet of music", the global supply chain orchestra will be playing their instruments, producing a masterpiece of sound. Technologies can help to integrate planning processes and ensure aligned responses to global events, and also provide a foundation for analytics that will become more important in the near future for competitive decision-making. Technology will also enable tracking of events beyond first tier suppliers, and provides a real-time update of key performance indicators used to ensure optimization of supply chain plans.

NETWORK. The interdependencies of globally networked supply chains means any disruption at a node radiates throughout the network. More than 70% of the respondents stated that they apply close coordination with key suppliers as a means to reduce disruptions. However, many organizations we spoke with do not fully understand who the parties are in their supply chain, and are increasingly becoming aware that tier 2 suppliers can shut down their entire network if they are not paying attention. An important component of resilient supply chains is thus building an understanding of not just who is in your supply chain, but gaining insight into their capacity, limitations, and paths through the network.

End-to-end integration turns out to be among the most important logistics and supply chain management strategy in the next five years. Top performing companies are sharing more tacit data, especially around R&D and other information that can provide a more holistic understanding

of requirements with their key partners. The other distinguishing feature is that they are sharing information across a broader arc of supply chain members, including tier two suppliers and LSPs. Our results show that top performers are also applying cost-to-serve analytics for logistics decisions, also in the context of outsourcing processes in the future. Indeed, there are indications that some organizations are beginning to internalize some manufacturing and other processes to gain better control over critical customer impact areas.

COMMUNITY. Your organization, like every other one in the world, can do much that is good, and much that can harm the environment and the community. As customers are more aware of these issues, proactive organizations are exploring new ways to monitor and measure not just carbon footprints, but also improved transportation networks, packaging, and end-of-life product strategies. In Germany, still less than 25% of the respondents measure CO2 emissions or social responsibility. Our survey results suggest that top performers are more likely to adopt green logistics strategies than other companies. They also tended to rate corporate social responsibility as a more important part of their logistics strategy than other companies in our sample.

The human factor is becoming a central point of contention, and organizations are holding their suppliers to a single global standard when it comes to labor and human rights violations. Less than 50% of both stationary and non-stationary retailers have adopted corporate social responsibility (CSR) in their logistics strategy. In light of recent scandals in food, apparel, and electronics supply chains, improvement in CSR supply chain management is an imperative. Organizations will increasingly need to work both vertically and horizontally with other agencies to form industry coalitions and government partnerships that will make the world a level playing field and one that continues to reduce its carbon footprint over time.

These concepts and ideas are not just theoretical, but are based on examples of people and organizations we have interviewed, witnessed, met with, and researched. There are certainly differences between industries and countries that are not discussed in this study in detail, and there is always potential for bias based on our sampling frame. However, we hope you will find these ideas to be worthy of consideration in your strategic planning process, and hope they may help you respond to the complexities of the logistics environment you face.

Changes From Previous Studies

One of the most important changes since our last study is the increase in the number of goals that logistics managers have to pursue simultaneously. Not only costs and performance need to be managed, but also a plurality of other, often conflicting objectives, such as risk mitigation, sustainability and innovation.

However, logistics cost remains one of the most important goals. These costs seem to replicate the trend found in the last study, as our figures from Germany reveal. Logistics costs are at 8.6% in German manufacturing companies, and the share of logistics costs as a percent of total costs has increased slightly with major differences between industry sectors and countries. Many companies (more than ever before) were not able to estimate the level of growth of their logistics costs in spite of its importance.

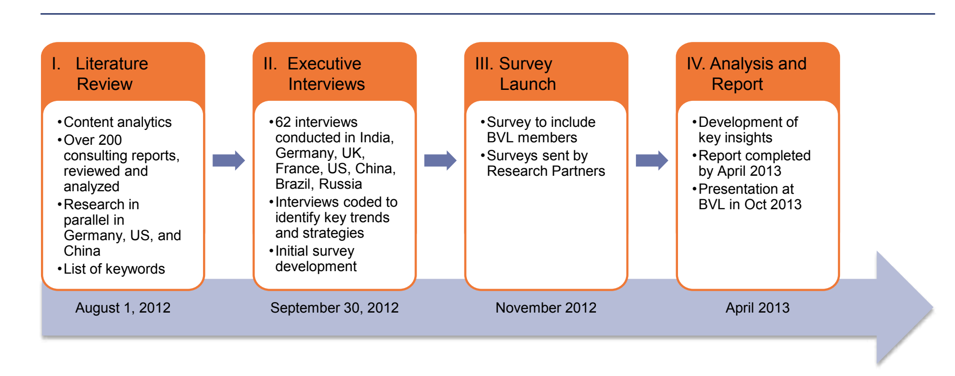
In many countries and industries logistics delivery reliability measures have not improved. Conversely, the gap between top-performers and laggards has even increased since 2008. The median value for delivery reliability is as low as 95% in major German manufacturing industries and in the retail sector, but better in the automotive industry (98%).

The trend towards outsourcing of planning and controlling activities seems to have leveled out relative to the last study. Outsourcing has been emphasized in operational activities (transport and warehousing), but is decreasing in the United States. Today less than 30% of logistics activities are outsourced in the United States, compared to 39% in Germany and more than 50% in China. During the last few years, outsourcing of planning functions like inventory management has not increased as much as predicted. One reason for the absence of increased outsourcing of planning functions may be due to dissatisfaction with outsourced provider performance. While 81% of German LSP managers believe that their customers are fully satisfied, only 51% of customers from German manufacturing industries are satisfied.

Methodology and Sample

This project was completed in four phases shown in Figure 1 by a research team led by Professor Robert Handfield from the Supply Chain Resource Cooperative, North Carolina State University, Professor Frank Straube and Dr. Andreas Wieland from the Technische Universität Berlin, as well as Professor Hans-Christian Pfohl from the Technische Universität Darmstadt.

The research team was supported by international partners who collaborated on interviews and survey data collection.



1 | Methodology

Phase 1: Literature Review and Content Analytics

The research team first completed a comprehensive literature review of prior studies, reviewing over 200 consulting and research reports. These were organized and key issues analyzed and extracted. In compiling this information, a proprietary content analyzer tool was applied to identify the frequency of major trends and strategies. The content analytics tool allowed a scan of thousands of research articles online to identify relevant articles and publications based on the number of search hits. This tool allowed the team to validate further the importance of the topics and resulted in a focal set of keywords and themes for further analysis by the team. We utilized a number of important German, English, and Chinese databases, including a Bloomberg supply chain analysis terminal, Lexis-Nexus, Ibis, Business Source Premier, and other databases. The research team then consolidated and finalized the list of trends and strategies that were relevant in the literature.

Phase 2: Executive Interviews

Based upon the results of the content analysis, the team developed a preliminary list of key logistics trends and strategies. Using these elements, we developed a set of interview questions and protocol for discussions with key industry executives. We conducted interviews with 62 international supply chain executives at the Director level or higher from the logistics services, retailing, and various manufacturing industries. Interviews were transcribed and coded into major trends and strategies.

The research team met in Atlanta to review the findings, and revise the list of trends and strategies derived from interviews. From this discussion, a survey of key items to include was developed and pre-tested. The survey was launched in November 2012, following the International Supply Chain Conference in Berlin in October 2012. The survey was provided in English, German, Portuguese, Chinese, and Russian, and posted to an online survey tool. The survey was then launched in conjunction with the following partners:

- American Production and Inventory Control Society, USA
- BVL International, Germany
- Council of Supply Chain Management Professionals, USA
- East Carolina University, USA
- Dutch Institute for Advanced Logistics, Netherlands
- European Logistics Association, Europe
- FDC Cabral University, Brazil
- Higher School of Economics, Russia
- ILOS – Instituto de Logística e Supply Chain, Brazil
- International Association of Commercial and Contract Managers, global
- Shintao University, China
- Supply Chain Resource Cooperative – North Carolina State University, USA
- Technische Universität Berlin, Germany
- Technische Universität Darmstadt, Germany
- Tongji University, China

Phase 3: Survey Analysis and Report

The survey targeted global companies across major global regions, in an effort to obtain a truly global sample of organizations. As shown in Figure 2, we obtained a wide diversity of responses from Western and Eastern Europe, Russia, the Americas, China, India, Southeast Asia, the Middle East and North Africa. A total of 1757 individuals completed the survey, of which 645 completed all questions. The number of responses per question varied based on the structure and response rate of the survey.

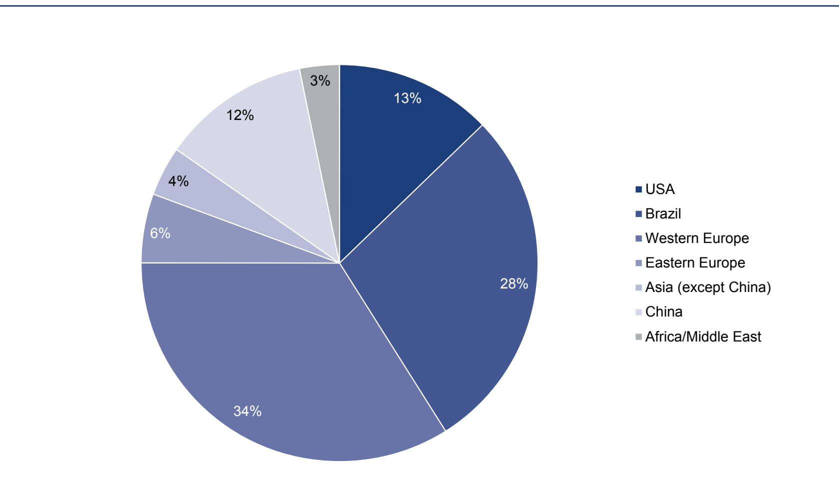
It was intended to stratify targeted companies across different sizes (Figure 3). About 39% of organizations were more than $500M in global sales, with the majority (41%) between $10M-500M, and a strong representation of smaller organizations (21% less than $10M).

Almost two thirds (61%) of respondents were from manufacturing industries, with 30% LSPs and 9% retailers. The sample of manufacturing and other firms is shown in Figure 4 as well.

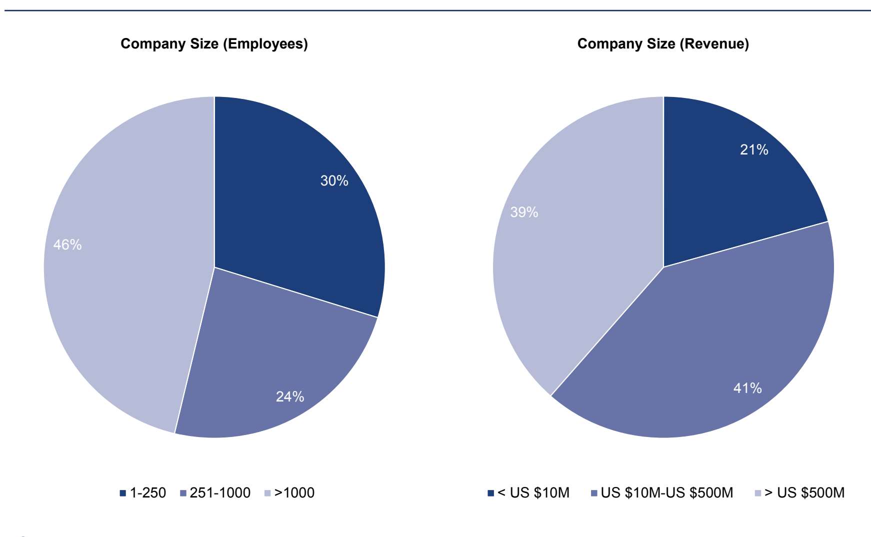
In the remainder of the report, we describe the major trends and strategies identified in the analysis.

For purposes of this report, a “Trend” refers to a shift or change that is moving in a general direction across the global logistics landscape.

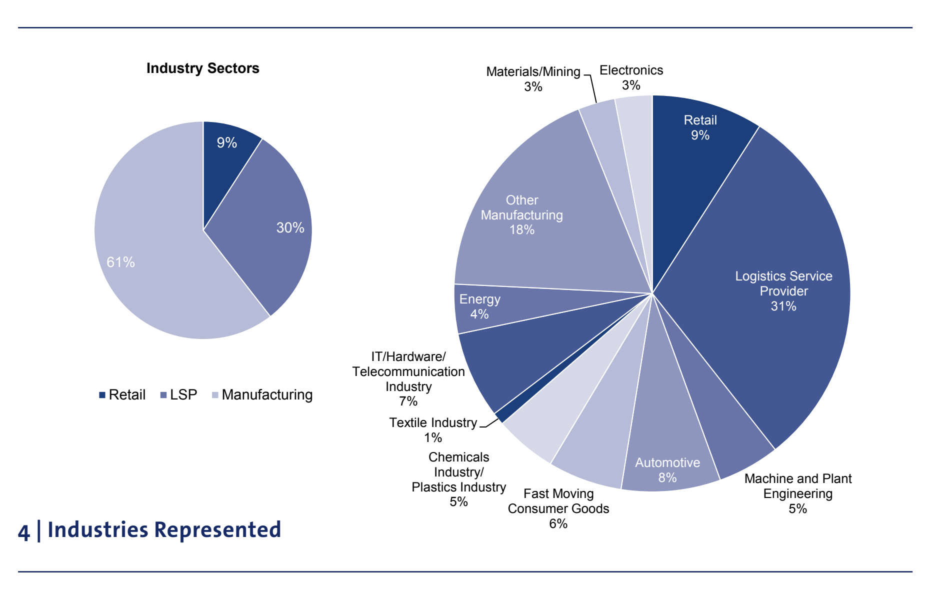
A “Strategy” refers to an organization’s intended plans to mitigate, respond, or react to a change/trend. The success of a strategy must be measured to ensure that the intended strategy did in fact address the challenge it was designed to meet.



2 | Countries Represented in the Survey



3 | Company Size



4 | Industries Represented

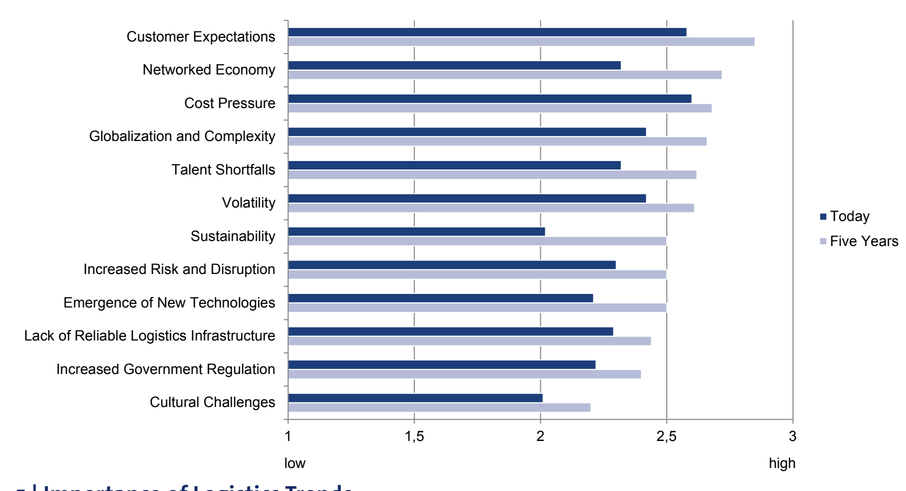
Key Trends Impacting Global Landscape

Overall top logistics and supply chain trends

Today's global logistics environment is characterized by increasing complexity and a number of important parameters shaping the global environment. The speed of change of these parameters is breathtaking and is driving increasing complexity in the logistics ecosystem. We have labeled these changes as "trends", in that they continue to re-shape the logistics landscape, and provide a shifting set of environmental risks and limitations that either constrain decisions, or alternatively present opportunities which nimble enterprises are able to exploit quickly.

We begin by describing the major trends that are impacting organizations, and follow up with some of the key strategies that successful organizations are applying to cope with or even exploit these trends. The graph shown in Figure 5 shows the importance of identified top trends identified by global executives surveyed in all countries, as well as their relative importance in the next five years. They are shown in chronological order from most important to least important.

The trends shown in Figure 5 reflect executives' perceptions that merit further discussion. We have grouped the top six trends into two sets of related forces, network and external forces.



5 | Importance of Logistics Trends

Network Forces

Network forces refer to changes that are occurring within an organization's vertical and horizontal network, which includes customers, suppliers, and LSPs that operate across the global value chain system. The major network forces are three-fold:

1. Increased customer expectations are being driven by consumers or marketing experts down to retailers, who are passing on these requirements on to manufacturers. Logistics service providers are being pressured to provide more and more customer-specific delivery solutions to meet a variety of customer demands. E-commerce is also driving increasing fragmentation of supply chain networks, further complicating the job of logistics providers to meet these needs. In effect, customers want it "my way", and are willing to switch brands and suppliers on short notice if they find someone offering a "better deal". Companies must have high quality, low cost, flexible delivery, reliable performance, and sustainable low-carbon solutions on top of it to keep customers satisfied!

2. Organizations are finding themselves increasingly part of a **networked economy**. As these expectations grow, enterprises in the supply chain are finding that their destiny is increasingly intertwined with others in the network. The old "arms-length" model of negotiating and competing with others in the vertical and horizontal network no longer works. Instead, companies are learning that they must collaborate with international partners to survive. Product manufacturing and service delivery are no longer stand-alone capabilities, but are increasingly bundled into a single set of capabilities demanded by customers. As companies cannot be "all things to all people", they must find new ways of working with not just customers and suppliers, but in some cases, other competitors as well!

3. Cost pressure is and will continue to be "alive and well"! That is, customers "want it all" – customer service, logistics capability, product innovation, and most of all – low cost! Customers are no longer willing to pay a premium for services, particularly logistics tracking and visibility capabilities. The expectation is that enterprises will provide complete visibility as part of their product and service offering. Cost pressure is also being driven by government pricing regulation, low-cost country imports from global competitors, and new forms of competitive pressures from e-commerce and other sources.

External Forces

External forces represent changes that are not occurring within the network, but are driven by other non-network elements over which organizations have little to no control.

1. Globalization of logistics networks is increasing. As companies continue to expand their global footprint, global networks are fraught with challenges due to **government regulatory forces**, channel fragmentation, and **poor logistics infrastructure**. An increasing risk of supply chain disruption from any number of possible nodes along the supply chain further complicates the logistics environment.

2. One of the most critical concerns on the horizon for global organizations is the impending **talent shortage** in global supply chains. This will occur not just in manual processes (truck drivers, warehouse workers, material handling, expediting), but also in managerial capability (buyers, planners, analysts, schedulers, warehouse supervisors, and distribution managers). Supply chains cannot operate without people, yet organizations are recognizing that they face critical shortfalls in the number of unfilled job requirements and the shortage is growing with every day.

3. Volatility of the ecosystem is the “new normal”. Volatility refers to major shifts in customer demand volume, product or service mix, government regulations, new competitors, substitute products, short product life cycles, and requirements for rapid network nodal changes and redesign. It seems as if enterprise transformation is now a continuous event, as organizations are continuously adapting and re-inventing their operating model in the face of continuous global change. The speed and scale of this change is unparalleled in the last decades.

These trends are discussed in more detail in the next section.

Detailed Discussion of Top Trends

Trend 1 – Customers are Demanding Specialized Logistics Solutions

The shift to a global economy is driven by a desire to access lower labor costs, but exposes organizations to higher transportation costs and regulatory shifts, which are in turn driving a dramatic impact on where companies source, where they produce, and the complexity of processes required to sell to the customer. As organizations grow and sell to more customers in more regions, complexity is rising. New global customers present a lucrative target, but there is a steep cost to servicing these customers. A global customer base creates a new set of challenges for organizations accustomed to providing standard logistics solutions to a homogeneous regional customer base. Customers are not only demanding perfect order and high delivery reliability, but are also requiring more customized and complex solutions.

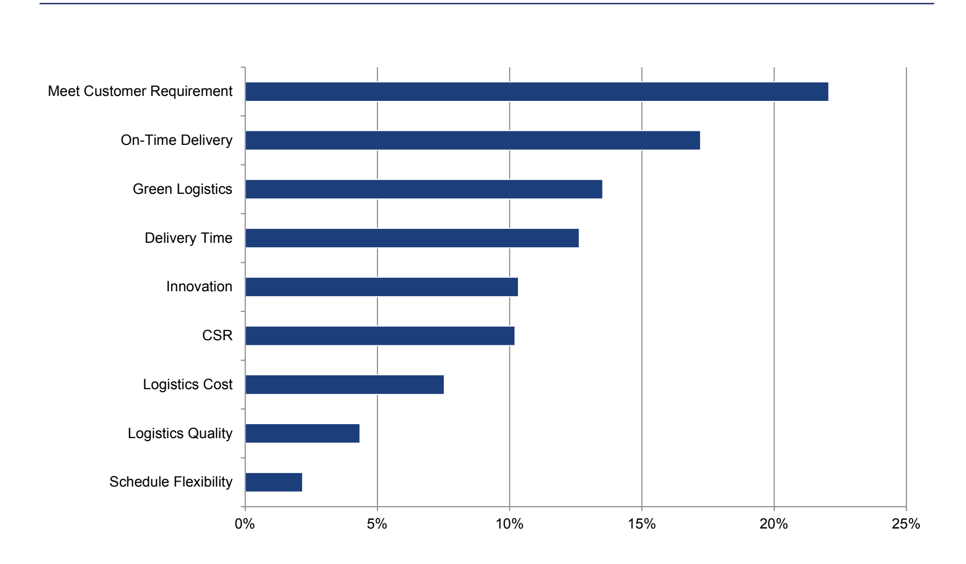
The nature of customer demand complexity is occurring in many forms. The most obvious one is that product supply chains are becoming more complex, as organizations need to create more diverse sets of product options, packaging designs, and logistics arrangements to meet a sophisticated set of customer specifications. Companies who serve retail and industrial channels all face diverse industry-specific logistics requirements for their products, including tracking and tracing, cold chain, or shelf stocking services. Customers require specific logistics delivery requirements given tight delivery windows, at locations that are often difficult to access. And with government regulation, delivery often has to occur during low peak times (during the night) or early morning. And customers demand perfect order fulfillment, and are not willing to listen to excuses. Penalties for lapses in performance by retailers in particular are quick and deep. In addition, customers are using new retail channels (such as mobile applications and on-line buying) that are also increasing channel complexity.

Figure 6 provide insights into the issues deemed to be the most critical logistics objectives. Managers' top priority was “meeting customer expectations”, followed by “on-time delivery” and “green logistics”. (These were ranked the #1 priority by 22%, 17%, and 13% of respondents accordingly, as shown in Figure 6). The majority of respondents note that customers can change delivery orders based on 10 days or less. A majority (over 50%) indicated that this window can be one day or less!

It is interesting to compare the data in Figure 6 to prior BVL research. In 2008, the BVL research team found that delivery reliability was the most important goal of logistics for all categories of firms (manufacturing, LSPs, and retail), followed by logistics cost. These trends suggest that customers are not willing to compromise lower performance for lower cost. In our current study, logistics cost is ranked #1 by only 7% of respondents in terms of ob-

jectives, as shown in Figure 6. It is also of interest that in the US, corporate social responsibility was rated as the #1 issue. This will be explored later in the report.

Another comparative evaluation of note is that in terms of absolute importance, delivery reliability and lead-time were evaluated significantly higher by logistics managers in countries characterized by poor infrastructure and uncertainty due to government regulations. This was most apparent in the ratings of managers from China and Brazil. A final point of note is that over the last few years, new objectives such as Corporate Social Responsibility have become more important in Western Europe and North America, but is not yet on the radar for emerging markets.



6 | Percentage of Logistics Objective Ranked Number One

Several executives remarked on the nature of increased customer expectations during our interviews:

There are multiple external forces and trends occurring in the global market. This includes the spread of urbanization, the spread of wealth, the economic power moving from West to East, young to old, the digitization of the economy, the increased focus on health – all of these things change the way people buy things. The importance of an information platform is also critical. In the future customers will have reach into supply chains, to be able to track the state of their product order. As IP addresses are attached to more and more processes and machines, customers will become increasingly involved in the supply chain and determining product customization requirements and outcomes. Our supply chain involves people buying products – and we are in the middle of all of this change, facing a different remit than what we have had in the past.
[US Electronics Executive]

As we expand and build subsidiaries in China, North America, Europe, and South America, we are seeing not only an increased internal material flow, but material that is flowing all over the world. We export 70% of our manufactured goods out of a North American facility. But the biggest challenge we see by far is the increased expectation of reliability our major retail customers are placing on us. This is a huge shift that has occurred in the last ten years. Where it was acceptable to be early with shipments, it no longer is tolerated. Retailers expect us to hit a window, and we have it piled on us, while inventory is closely watched. Both early and late are bad.
[European CFMG Executive]

Because Make-to-Order is our predominant business model, logistics is structured around how to deliver to our customers' specific requirements. Our customers have very different logistics business requirements. We serve many of the big aerospace companies who have very specific requirements, and then our automotive customer requirements couldn't be any different. And we also serve a retail sector that has a completely different set of logistics requirements. And these vary significantly in different regions as well. Regardless of the requirement, we have to deliver on our promises to our customers, as well as to our suppliers. But we struggle with the complexity of our business driver. The requirement of providing products globally around the world as it relates to regulatory requirements and free trade, what we have to do to comply to international laws, dealing with local logistics infrastructures, and meeting a specific customer requirements continues to be a struggle for us.
[US Industrial Manufacturer]

Trend 2 – Companies are Increasingly Part of Networked Economies

The second most important trend refers to the requirement that organizations build network capabilities to survive in the competitive environment. There has been an explosion of new channels to customers that are not well developed and that are interlinked with other channels. For example, consider the apparel industry. The old formula for apparel retail success was straightforward: give customers quality on-trend garments at the right price point in an attractive store setting with helpful sales associates. The supply chain only had to deliver goods to the retail store. Today, however, bricks and mortar stores are only one of multiple channels. Others include outlet locations, e-commerce sites, social and mobile sites, catalogs, and other seasonal/single-use channels such as pop-up stores and flash sales. And with these new channels, supply chain managers must simultaneously accommodate and anticipate varying internal and external demands to meet time windows, keep costs low, ensure inventory can satisfy channels, and help fuel growth.

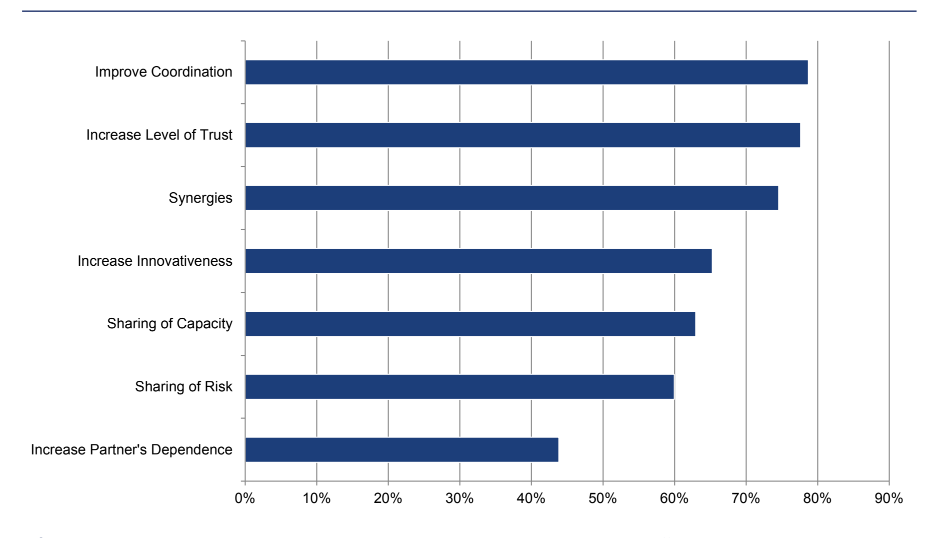
In a networked economy, enterprises are expected to have extreme levels of flexibility. Manufacturers need to be able to adapt to new product requirements or suppliers. LSPs need to offer flexible services. Retailers must grapple with how to fulfill different types of orders, and how to handle inventory behind the purchases, as customers are offered an array of different delivery mechanisms (ship to home, pick up at store, etc.). And e-commerce orders which are typified by higher volume but smaller picked orders delivered to homes are more common. To complicate this, reverse logistics capabilities must be established to handle the high volume of exchanges, returns, and damaged goods as more websites cater to a guaranteed zero cost of return policy.

To cope with this environment, companies are seeking to outsource more technology design, inventory management, working capital investments, and planning execution to other partners in the supply chain. Experts have warned that driving too much responsibility up the supply chain can result in significant risk and loss of control. Companies risk losing control of the channel if suppliers decide to integrate downstream towards customers.[1] In such cases, the total cost of ownership (including such things as transportation and inventory management) become opaque to the OEM, and the enterprise can lose leverage to reduce costs if they hand over an entire product subsystem to a single supplier. This trend is offset by the other view in industry that logistics is all about cost savings, and is often not recognized by many as a source of value-added capability.

An offshoot of this trend is the bundling of product and logistics solutions. Customers are requiring solutions to problems that they face, which means being able to not just have the physical movement of the product, but a combination of packaging, distribution, tracking, and responsiveness to requirements. This has been the case in the automotive industry for years, where JIT deliveries on an hourly basis based on real-time EDI transmissions is the norm. Increasingly, organizations don't wish to manage inventory, and are requiring suppliers to provide vendor-managed inventory, real-time responsiveness to inventory tracking software, and technical support. Many companies are unable to provide these capabilities on their own, and are partnering with solution providers to develop combined product-service supply chain solutions.

Of note is the fact that customer expectations and networked economies are particularly important in many developed countries. US managers also ranked global complexity as an increasing trend. Another interesting point was the difference in Brazilian executive responses. Here, the main logistics trend is similarly customer expectations, but a myriad of other trends are also perceived as critical, including cost pressure, talent, networked economies, and unreliable infrastructure. We also found that emerging technology was higher ranked by high-tech industries.

Many of the companies we interviewed recognize that they cannot "do it alone", but need to become experts at managing global relationships. This is particularly true in regions where sales are only starting out, and in many cases, companies need to figure out the "pieces of the puz-



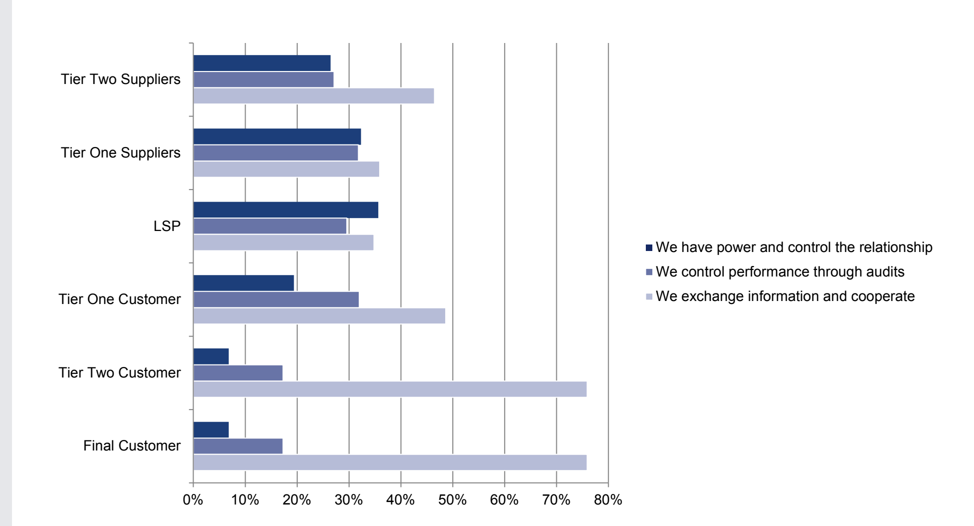
7 | Percent of Respondents Rating Reasons for Collaboration as "Important"

zle" and what it means to operate regionally. To do so, partnerships are key, particularly for importing into regions. Many countries have specific requirements for packaging, shipping, and other importation issues that require customization of logistics processes. Organizations need to develop specific packaging requirements inside these countries to meet government laws, and then set up processes to import products and customize to the local market. Shipping across borders has an impact on the effectiveness of the channel, and so organizations need to carefully choose distributors and selling locations. A supply chain strategy involves making decisions: How do you distribute? Into your own warehouse structure or another? And how many distributors do you select for the territory? Organizations are recognizing that they need to identify partners who can optimize and understand local legislation and conditions to effectively navigate this increasingly complex set of decisions.

The importance of networked relationships as a trend was corroborated in our research results shown in Figure 7, that shows the importance of collaboration with supply chain partners. The most important reasons identified by almost 80% of executives for collaboration in the supply chain is to achieve improved coordination and increasing trust, as well as to improve synergies and increase innovation. In the words of one executive: "Collaborate or die!" It is clear that organizations are seeking to develop new forms of logistics value and innovation, and an open and trusting dialogue where all parties can open share ideas for improvement is an imperative for survival. There are still many issues relative to identifying the right partners for long-term network relationships, but the data clearly supports a direction that is leaning towards a more cohesive and integrated set of networked relationships with fewer partners. Such relationships are built on identified synergies that create new capabilities, innovative supply chain solutions, and shared capacity and risk.

As shown in Figure 8, we assessed the mechanisms used to manage relationships across different categories of supply chain members, as seen by the focal companies. For example, a typical automotive supply chain is represented by a final customer, a dealer (typically tier one or two customer), an OEM (focal company), an LSP, a component assembler (tier one supplier), and a subcomponent manufacturer (tier two supplier). Our results suggest very different approaches are emerging in managing networked relationships downstream (customer end) versus upstream (supplier end). An approximately equal blend of contractual controls, audit measures, and information exchange is used in the upstream echelons of most supply chains between tier two suppliers, tier one suppliers, and LSPs. However, downstream participants (tier one customers, tier two customers, and final customers) are less likely to employ strong-armed power tactics in relationships, but are more likely to manage relationships through open sharing of information. This finding supports results from our 2008 study that information received from customers is not passed to suppliers. This finding also corroborates executive comments that companies are pushing working capital onto their upstream suppliers. These companies are more likely to delegate power and control to suppliers when it comes to management of supply chains. Upstream suppliers are more likely to push information down to customers more frequently, in the form of advance ship notices, inventory information, demand management, and other forms of alerts. In such cases, organizations are much more likely to collaborate and share information with these parties as they have less control (customers), and are required to comply with their needs for information, or risk losing business.

We are moving more towards systems solutions for our customers, not just chemical product shipments. We produce solutions with products that include third party materials. In construction, we don't sell insulation; we sell square meters of insulated walls. We don't sell paint we sell a colored chassis. This is a whole new dimension of supply chain management, which is not just about order shipping, but how you can team up with others in the supply chain to bundle your product capabilities with theirs to deliver on time to the customer. This is 40% of our portfolio today, and we are reaching even further into the supply chain. [Chemical Executive]

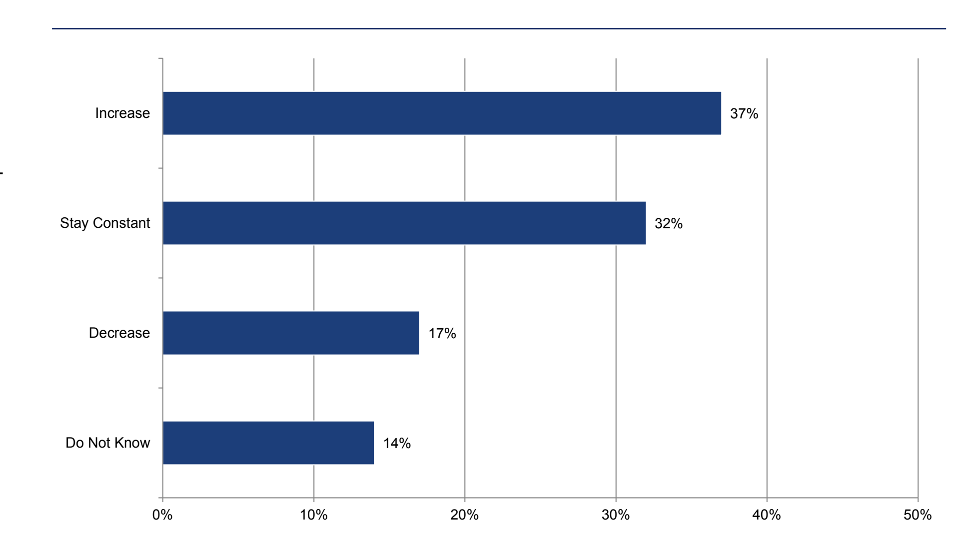


8 | Percent of Respondents – Mechanisms Used to Manage Relationships



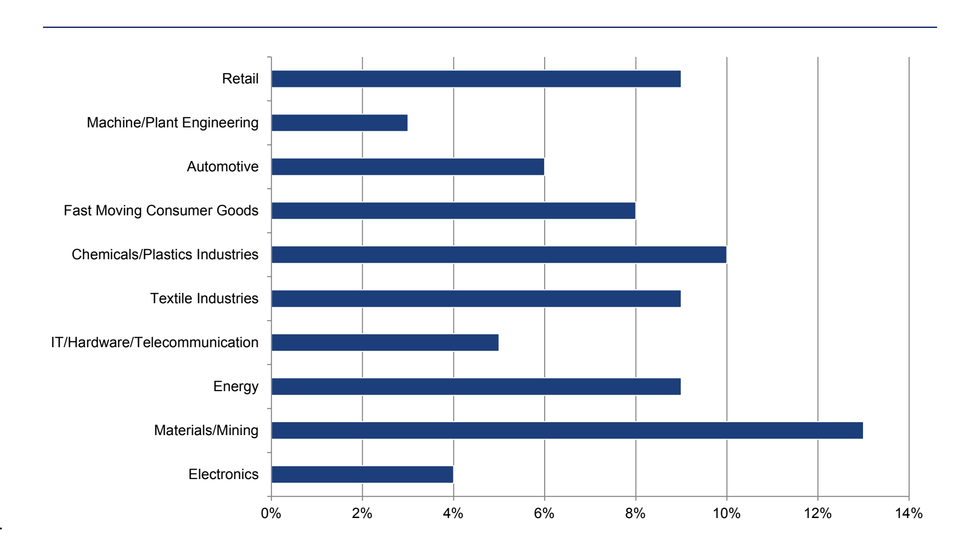
Trend 3 – Customers Are Relentless on Cost Pressure and Working Capital Reduction

Competitive cost pressure continues to drive organizations to seek optimized logistics networks. The pressure of the last five years has driven many companies to capture the "easy" cost savings, and additional savings require more sophisticated approaches. The era of moving supply to emerging countries to exploit low cost labor is drawing to a close, as the savings are not as easy to find as they once were five to eight years ago. Organizations are finding that they must begin to truly adopt analytical tools to design their logistics networks that capture multiple cost drivers (not just labor).



9 | Logistics Costs Trend During 2012

More than a third of respondents noted that logistics costs have increased in 2012 (Figure 9), while another third stated it had stayed constant. No standardized methods exist in research or in business practice to measure the logistics costs as a percent of overall costs/revenue of a company. This is due to several factors. First, standards defining what elements of transportation, purchasing, materials handling, quality inspection and other costs belong in the category of logistics often vary between divisions in the same company! A baseline definition of what is included in logistics costs also varies between companies in the same industry. Despite this limitation, Figure 10 shows logistics cost as a percent of overall revenue as estimated by respondents. Logistics costs exceed 8% of revenues in industries such as retail, fast moving consumer goods, chemicals, textiles, energy, and mining/materials. These industries not surprisingly have a strong interest in optimizing their logistics network. Logistics costs are higher for stationary retailers than for mail-order retailers.



10 | Share of Logistics Cost as Percentage of Overall Revenue in Selected Industries

It is noteworthy that, when we questioned our respondents in the last months of 2012, still more than one-sixth of them did not know whether logistics costs would increase or decrease by the end of that same year. Given that all of our respondents are responsible for logistics and supply chain management in their respective companies, this is a remarkably large portion that can, in part, be explained by increased uncertainties and volatility in international markets. Clearly, analytical tools and standards are needed that enable managers to have a better ability to capture and measure logistics cost data.

The share of logistics costs as a percent of overall costs varies substantially between different industries. For example, international companies from industries related to machine and plant engineering or high-tech companies have a substantially lower share of logistics costs than companies from the chemical and plastics industry. High logistics costs are also common in the materials and mining industry (Figure 10). In automotive, more organizations are moving to local suppliers for JIT delivery, which is reducing logistics costs. Indeed our results showed that when compared

to high-tech industries (where logistics costs increased), logistics costs decreased in the automotive industry. Even so, transportation costs account for more than 30% of total logistics costs in automotive.

Calculated as a percentage of overall revenue, huge variations were observed when comparing logistics cost between different regions. In China logistics costs were more than 14%, but less than 6% in the US (even considering that US costs increased in 2012). There was also significant variance between industries, where logistics costs were low for automotive (6%), machine and plant engineering (4%), but high for chemicals (10%). As noted earlier, 14% of participants did not know their logistics costs in 2012! This may be due to a lack of proper accounting measures, as when transportation is folded into supplier costs.

Clearly, the pressure to reduce costs and working capital is part of the global landscape that is likely to persist. Organizations must therefore find innovative ways to provide new solutions to complex customer requirements, without increasing costs. However, there is also an indication that customers are learning to value prompt and reliable delivery over cost in some situations, and this indication is explored further in our study.

The increasing pressure to reduce cost and shift working capital upstream was mentioned by several executives.

We monitor our global supply chain constantly to track costs. About 85% of costs are from purchased parts, 10% are logistics costs, and only 5% are manufacturing assembly costs in the PC business. Logistics costs are thus critical to control, especially as we expand into different markets. Although China remains the largest market for us, the fastest growing markets are in North America and Europe. In South America, Argentina and Brazil are the two largest markets, and although it is less expensive to ship Chinese-assembled computers to these regions, local governments require at least 30% of parts be sourced locally. This has pushed us to build more production lines in Brazil.
[US Electronics Executive]

Customers in India are expecting cost reductions in the supply chain on an annual basis of about 2-3%. India has rising employment costs, so pressure on the supply chain is focused on its redesign and optimization. As a LSP, we are redesigning the trucks to carry larger capacities, driving freight consolidation and designing routes so that multiple customers can be served by a single truck.
[Indian Logistics Service Provider]

Customers are demanding flawless execution and flawless launch, and don't want to hear about your supply chain disruption excuses. Assembly plants want lower inventory. And automotive customers want more technology that is safer, meets more stringent regulatory requirements, is sustainable, and offers connectivity to mobile technology and apps to download. So suppliers have to recapitalize the design of new products to migrate from old technologies, and the stakes for failure have become higher.
[US Automotive Executive]

With increased competition in automotive in Brazil, there is greater pressure to reduce cost. To do so, our biggest focus is on supply base optimization. We have too many local suppliers, so we are trying to introduce Chinese and Indian suppliers to drive local competition. We work with local suppliers to show them they are not competitive, and show them imported parts versus their parts to show them they can't tell the difference, even though the imported part is 30% less costly.
[German Transportation Manufacturing Executive]

Working capital is being protected. Automotive assembly plants want less inventory, and they are shifting the burden on the supplier. Toyota started doing this 20 years ago, and it has shifted to the entire industry. What this is doing is forcing more capital investment on the supply base where they share risks, and driving suppliers to take on more capital investment roles and deliver sequenced parts to assembly. Suppliers are attempting to protect these investments through contractual language. This is being driven by the fact that more global companies are seeking a higher internal rate of return due to the injection of investment capital in these markets. This push to get a higher return on capital means pushing capital investments on the supply base. That will continue for the next several years to come.
[US Automotive Executive]

Trend 4 – Global Sales Channel Footprints are Growing and Fragmenting

Organizations in multiple sectors are continuing to pursue global growth strategies that focus on expansion into new regions. In particular, the focal BRIC countries represent major targets for expansion, but with them come a host of new problems which enterprises have little experience in dealing with. Examples of major growth strategies and the associated challenges were found in multiple industry sectors. Some of these were driven by economic realities, currency movements, government regulations, or access to existing logistics networks. For example:

- Ford outlined a plan to introduce several new vehicles over the next two years, without having to invest in assembly plants. US auto exports are increasingly helped by both restructuring of Ford's footprint in the US and the dollar's favorable exchange rates. Likewise, Honda, Nissan, and Toyota also plan to use the US and Mexico increasingly as an export base as the strong yen causes them to lose money on vehicles exported from Japan.[2]

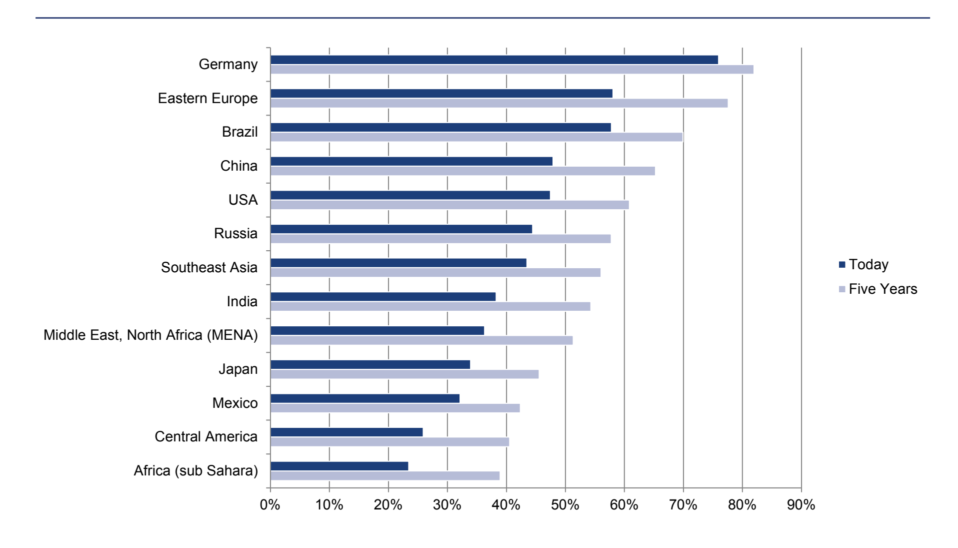
- Wal-Mart recently acquired Massmart Holdings, one of the largest South African retail chains, after overcoming regulatory hurdles and opposition from labor groups. The company is unrolling a domestic supplier development effort to train suppliers on how to do business the "Wal-Mart way". South African suppliers such as Foodcorp and Premier Foods are eager to get on board, as many were left to build their own brands domestically when many companies pulled out of South Africa under the legacy of apartheid. Wal-Mart is also making efforts to improve the largely manual operations at warehouses, but is also seeking steep pricing discounts from suppliers to align with their cost-cutting culture. Wal-Mart believes their knowledge and experience can also cut costs in distribution and logistics. Wal-Mart has apparently learned from their costly mistakes in entering other new markets. For example, they pulled out of Germany in 2006 after trying to transplant their U.S. culture without understanding the shopping habits of German customers.[3]

- Lenovo was primarily considered a Chinese brand, but has moved to a number two revenue global ranking in computer sales, after taking over the IBM PC business, and growing into tablets and other mobile devices.

Where is this global growth occurring? As shown in Figure 11, the current footprint of respondents to our survey lies still within the major Western regions, with the top five spots being Western and Eastern Europe, followed by South America, China, North America, and Russia. Note that the sample is biased by the high number of German respondents, but is still representative of the level of growth globally.

The five year projected footprint shown in Figure 11 shows an increasing level of globalization, as more and more organizations expand their logistics network and sales abroad. The research results suggest that Russia and Eastern Europe are the regions that 20% of respondents identified as a growth region. Both Russia and some other parts of Eastern Europe represent high growth but also high risk countries to operate in, due to the difficult government regulatory environment. Another 15 to 20% of organizations are expanding into India, Africa, the Middle East, and Central America. These regions are characterized by unreliable logistics infrastructure, difficult government regulations, and a lack of logistics talent. Also of note is the growth into China which is at a much lower rate of growth than in the past. Organizations are finding that the value proposition for many firms in China is disappearing as the competitive cost advantage is beginning to erode relative to other countries. Government policy and social issues are further compounding the complexity of doing business in China.[4]

One important note is the growth of Africa as a region for global expansion. Along Africa's Atlantic coast, garment factories are giving up African couture to assemble scrubs, aprons and lab coats. The switch comes as global suppliers seek out Africa's low-cost, English-speaking labor and ports that are 10 days closer than Asia's garment factories are to the U.S. eastern seaboard.[5] In terms of delivery lead-time and working capital, ten days is a significant factor that is driving many large retailers such as Wal-



11 | Percent of Respondents Operating in these Regions Today and in Five Years

Mart to sourcing items such as hospital apparel. As minimum wages in India, Malaysia, Thailand and China have increased by as much as 10% in 2012, wholesalers have invested in sources of supply in Africa. Although these regions have not seen the volumes that China's factories have seen, laws such as duty-free exports passed by the US government has encouraged such industries to spring up. The fact that Ghana is an English-speaking nation with a stable democracy has also helped speed up growth in this region, although productivity rates still do not match those of China.

One of the biggest trends associated with this growth is the increase in complexity of global networks. Complexity occurs in many forms: more facilities, more infrastructure, more suppliers, more product variations and SKUs, smaller numerous and fragmented sales channels, and increasing regulatory and transportation security requirements. Organizations also struggle to prioritize the complexity of strategic objectives they face, including sustainability, globalization, and risk reduction. Many organizations are finding quickly that they are at times overwhelmed by this complexity, and become caught up in daily firefighting and monitoring of conditions. As noted, top performers are embracing complexity, and rather than trying to predict it, have established mechanisms to become more responsive and adaptive to change.

Growth of the global logistics network is fraught with increasing difficulty. Large BRIC country governments have recognized their power in the channel, and have raised the stakes for import and export requirements and regulation. There is also considerable debate among experts as to the path this will take. Some commentators believe India will continue to grow, while many point to the many untapped domestic markets in China and Brazil. BRIC countries all have significant import challenges. Quite a number of Western companies have been buying domestic Chinese, Brazilian, and Indian companies to get access to their distribution networks. But others note that this approach has become very expensive and that "there are no more bargains out there. If you want to be in China to gain a foothold through acquisition, you should have been there 3 to 4 years ago" (Global pharmaceutical executive). In fact, there is increasing evidence that Asian growth is slow, and will continue to slow in its rate of growth. Chinese companies have started to buy domestic Western companies, a sign of the time.

With globalization, the need to partner with local logistics service providers becomes an imperative. Such providers understand domestic transportation issues, and can plan to develop long-term solutions to complex local distribution challenges. This was emphasized in several of our interviews.

We provide a complete in-bound logistics service for [Japanese auto company] including inbound, outbound, cross-docking, and JIT delivery. A centralized planning team coordinates, and we have cross-docks and consolidation in different regions throughout India. A big trend we see is multi-local operations, moving away from centralized approaches to regional capabilities, but with global planning. This requires close communication between our team and all parties in the customer's supply chain.
[Indian LSP to automotive industry]

For crop protection chemicals, the fastest growing markets are Brazil, Eastern Europe, India and China. We are also seeing moderate growth in the United States. But the Chinese market is especially difficult, and we see a lot of regulation. India seems to be more open than China in working with multinationals. We have had to set up manufacturing in China to allow us to gain access.
[German Chemical Company]

A big concern is that China does not enjoy significant cost advantages anymore. While front-line workers in China are still paid much less than those in developed countries, middle to high level managers in China now have similar pay as their counterparts in Western countries. We are looking more at competitive alternatives such as Mexico. For the North American market, Mexico provides a low cost advantage and logistics cost advantages. We are constantly reconsidering production locations to achieve both low cost and customer service. Eastern European countries are also looking very positive.
[US Electronics]

As a sign of the times, a German company Symrise closely collaborates with more than 1,000 vanilla farmers and "the entire procurement process takes place locally, from cultivation and harvesting, to the fermentation of the beans, all the way through to extraction". The company partners with NGOs, development organizations, and farmers' associations to ensure "that its projects in the areas of environmental protection, income diversification, nutrition, health and education continue to blossom over the long term". Symrise benefits from these activities by receiving reliable access to top-quality raw materials.[6]

Organizations will need to continue to find networked solutions in response to the continued growth of their global footprint, which surely will continue due to the appeal of large mass markets in BRIC countries and beyond.

Some statements from executives below provide insights into the nature of the different forms of complexity faced by logistics executives.

Globalization increases complexity in all aspects of our operation – we have more plants in more countries, with more suppliers and more diversity in our product, which means more part numbers. The speed of trends is tremendous, as we have to cope with different standards in each country. We arrive with a neat German mindset and then go to India and see cargo freight operations in the Chennai Airport! Indians won't change for us – so we have to learn to cope!
[German Automotive Company]

If you want to operate in South America you need Spanish and Portuguese and changing packaging is not that difficult. But in Asia, there are many different scripts and packaging requirements, and it is a very difficult and complex environment to operate in. There are lots of languages and specific government requirements. This has dramatically increased the number of SKUs we manage, as well as made shipments smaller and going to more locations.
[UK Pharma].

We will see dramatic growth in complexity in multiple dimensions. It is not just growth of production volumes, but the doubling or tripling of volumes in existing plants, as well as new production plants in places like Mexico, Brazil, Russia, and other regions. There is also a dramatic increase in the number of models, and more common part numbers. And because of the large number of hub and spoke relationships, we have relatively little intercontinental volume. This means we have to develop more local suppliers, and this has dramatically increased the complexity of our global logistics network. We don't want to ship large components all over, but for other parts where the main cost driver is not logistics, tooling may be the factor.
[German Automotive]

In Brazil we don't see any big consolidation, but rather are seeing a massive expansion in small neighborhood stores, which brings a strong challenge in our distribution network. Small stores translate into an increase in deliveries and a decrease in size of truckloads. We are moving away from the large stores that occurred during a period of high inflation, and are not seeing any consolidation from the big retailing chains like Wal-Mart and Carrefours. The growth is all going to smaller retail locations.
[UK Consumer Goods]

To begin to establish a domestic international distribution network without investment, organizations are exploring opportunities to build network partnerships. Consider the example of this organization model described by one executive:

We work with many accounts: service-driven customers, large accounts, small accounts- and multiple flavors, but it is only inside the infrastructure that you can really begin to differentiate your setup and costing. Our approach was to introduce the "indirect channel approach". This involves direct shipping of products to distributors, which allows you to generate savings. You take those savings, and you put them on the table, and tell your distributors that they can share in these savings if they will work with you to change their processes.
We bring the promise of the savings to drive the underlying change principles in developing market countries. And that gets things going! Seeing the savings on the table gets customers going, distributors going, as they see the strategic advantage of a different working environment. This strategy allowed us better reach to our customers, by using existing distributors who already have a presence in countries like India and Russia. These distributors allow us to get a better reach into the market, but at a cost of having them handle our product. The only way to do that effectively is to eliminate touch points into the supply chain going in to that country - what we call the direct chain. It is costing you money to unload a container, so the idea is NOT to touch it, and to ship it directly to the distributors. But the only way not to touch it is to control the sales process, and to control your marketing process, and look for consistent growth for volume flexibility inside the model.
[European Business Services Executive]

Trend 5 – Talent Continues to be a Challenge

Every one of the executives we spoke with mentioned the lack of talent as a critical barrier to driving logistics progress and improvement. This discussion was mentioned across all of the regions we surveyed: The root cause of this problem is not simple. Managers from Western European countries noted that young people do not view logistics as an exciting career. Instead, students and graduates often have greater interest in finance and marketing careers. On the other hand, North American companies noted the growing number of retiring executives with a lack of talented people to replace them. They also note that young people are not as willing to travel, which limits their career options in logistics!

In India, China, and Brazil, the shortage of logistics talent was the most challenging issue, as many universities in these countries do not have logistics training in their curriculum. Managing a logistics talent pipeline means not only recruiting the right talent, but retaining and keeping talented individuals on-board in a competitive market for supply chain professionals who have the requisite experience and leadership. This is occurring not just at lower levels, but mid-level and senior level roles.

Talent is one of the biggest challenges we face in Brazil. Because of the growth we have seen in the last 5-6 years, we have a lack of talent and high turnover in senior positions and operational positions. Apart from the infrastructure issues with Brazilian logistics, the lack of well-prepared professionals in open and low end senior levels is the biggest challenge in the environment today. Many universities have begun introducing logistics courses and we hope this situation will improve.
[Brazilian consumer goods]

We have a huge human capital agenda in Europe. We have to differentiate different levels of skills and people, starting with the people in the warehouse, and moving up to the managers. We need to start by building training schools to improve the image of logistics. We need to bring a more educated workforce into the bottom of the rung, and grow them into middle managers. And finally the senior management level is a problem, because the number of university programs in logistics is pathetic. Universities do not think that logistics is sexy, but we need to make young people realize that product availability through logistics is a core attribute of customer service. We need to bring this recognition through public events, including organizing the Olympics, pop festivals, and other areas that will appeal to young people.
[European logistics executive]

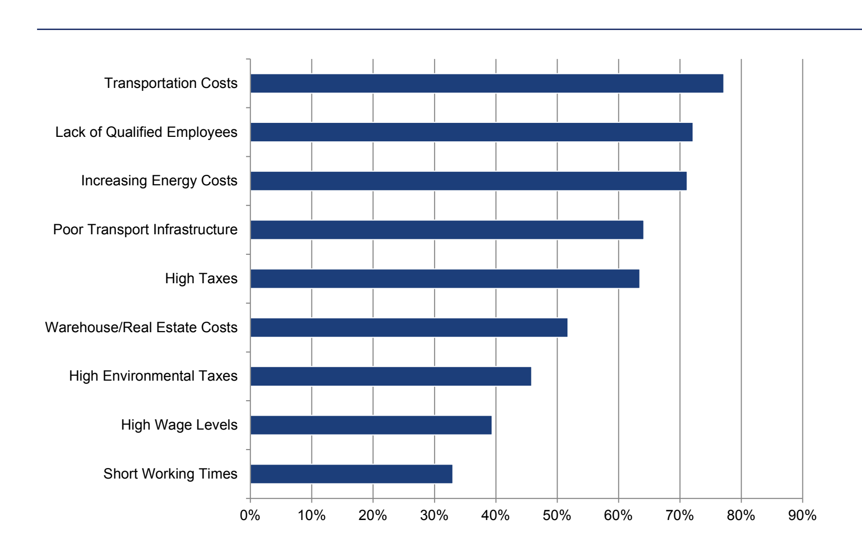
Even if we have a competitive salary I can't find the experienced people that I need. Combined with the complicated HR policies mandated by the government, the equation for people just doesn't fit. The Brazilian business culture does not encourage studying and obtaining an advanced college degree. People just don't see the idea of higher education as a must-have.
[Brazilian truck manufacturer]

In China we have had good luck getting entry and mid-level people, but senior managers are very difficult to recruit. This is also the case in India. We have tried to hire more good technical people and train them. We bring them to our factories in the West and partner them with an expat, and then send both the local manager and the expat back to the home country for 18 months, and then the expat will leave. The practice of learning shoulder to shoulder with the expat provides the overlap that sets them up for success.
[Chinese manufacturing executive]

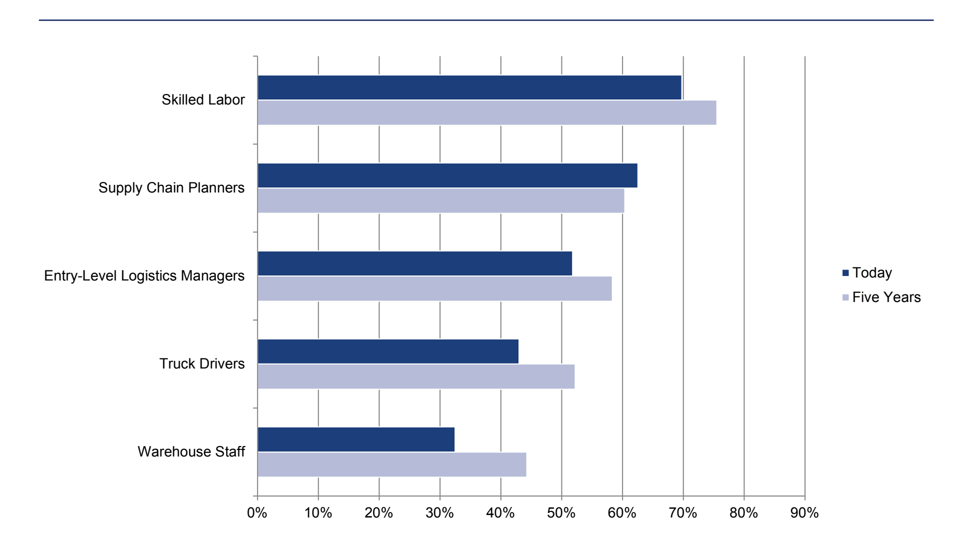
I have talent gaps especially in technical areas that focus on machined parts for supplier development. I don't need managers, I need people with machining knowledge who can understand how to improve cost in supplier–manufacturing processes. You can't teach someone how to do this, even in a year. And these people are especially needed for supplier development, which involves assessing a supplier's operations for gaps that exist, and identifying areas to improve to make the supplier successful. Suppliers aren't always able to improve their own processes, and leading companies are investing in suppliers' capabilities through technical assistance and dedicated resources.
[US Automotive]

This result is clearly seen in Figure 12, summarizing responses to the question: “Our logistics capability is most negatively impacted by….”. As transport costs are a major challenge (discussed previously), the second most important element is a critical lack of qualified employees, a trend identified by almost three-quarters of executives globally.

A second insight shown in Figure 13 is that the talent gap is most apparent in the areas of skilled labor and supply chain planning. Both areas are critically short, despite a growing unemployment rate in many regions of the world. The fact that more than 60% of firms see major shortages suggests that the issue is not so much getting people, but getting “the right people with the right competencies and skills”. The perception is that this shortage in skilled workers and planners will continue to escalate. The biggest growth in terms of shortages will be for certain types of skilled labor, i.e. for warehouse workers. As the number of experienced workers begin to retire, there will not be enough replacements to cover the growing logistical requirements and complexities in the global environment. Finally, there is also a clear signal that the shortage of entry level logisticians will continue to rise, as universities are not focusing on graduates with these profiles in the short-term, and this could continue to escalate as an issue.



12 | Percentage of Firms Rating Logistics Capability as Negatively Influenced by …



13 | Types of Talent Shortages Experienced (Percent of Respondents)

Trend 6 – A Larger Global Footprint Creates More Volatility

Volatility is a measure of variation in conditions, whereas risk is the probability of a major disruption to operations. Both are relevant in the discussion of complexity in the global logistics environment, but volatility is perceived as increasing significantly in the logistics environment. Volatility occurs due to increased globalization linked to variation in labor costs (in countries such as China), shifting fuel costs and regulatory changes, and other parameters that influence where companies source, where they produce, and the complexity of processes required to sell to the customer.

Volatility is often driven by unreliable elements in the supply chain that make prediction for delivery challenging. An example is the unreliability of global logistics channels, especially the challenges associated with ocean freight lines, which are becoming increasingly unreliable. Labor issues at ports, larger ships, port capacity, and multiple other issues are driving executives to worry about the status of their shipments and whether they will reach their destinations in time to meet customer requirements.

Many executives noted that as their organization's global footprint expands, there is increasing complexity of government regulations, especially in the area of logistics regulations, protectionist policies, product regulations, compliance to customs, trade, local content issues, and security requirements. As the private sector seeks to expand its growth in emerging countries, there is increasing pressure economically in these countries to levy import codes and product restrictions to drive revenue and protect local industries. The failure of the WTO to drive liberalization has resulted in increased regulatory barriers to logistics.

The challenge of increased volatility in global supply chains was noted by several executives interviewed.

A prominent issue is the labor negotiation in US ports. There has been a temporary agreement established, but there is a significant possibility of disruptions for shipments coming from the Far East and Europe in 2013. We cannot divert to West Coast ports, as there is little flexibility and not a lot of capacity. The port situation will continue to be a major problem, as there is no room to expand and no extra capacity. And even those doing diversions are not getting favorable treatment, because if you are not a top importer, you are stuck in the back of the queue. There is no guarantee that your shipment arrives on time even if it goes to the West Coast, as there could be a "sympathy" slow-down, and railroads could also decide to support the union. I don't have any control over that. [US Retailer]

Safety and security issue is becoming a critical issue in China. To date, most companies are still focused on addressing property protection when considering supply chain safety. Very few companies fully realize and understand the impacts of supply chain volatility and the consequences, and even fewer consider means of preventing disruptions. [Author, Chinese 5 Year Plan for Logistics]

We see increasing volatility and complexity going forward. Given our relative fixed structure in the chemical industry, this poses huge challenges in terms of supply chain agility and coping with volatility. We have moved our downstream much closer to our customers, and we are now shipping pallet loads as opposed to truckloads and trainloads as we did in the past. Customers used to order six months worth of supply – and now they dump orders mid-month based on raw material pricing volatility and capital availability. We can watch events in financial markets and tie them to our order cycles, which is a different type of volatility than the bullwhip. [German chemical company]

In Brazil there are many restrictions on traffic and trucks, and it is hard to have a transportation company with the regulatory issues. One thing that is a threat is the level of robberies and theft. You don't have a lot of options for transportation as 85% is by road and insurance is very high. You cannot put big loads in a full truck-load, as for some of our freight it will be a $5M load, and the insurance risk is too high. The insurer will insist that you split it into five trucks of $1M each and that is another restrictive issue on good optimization for logistics. [Brazilian LSP]

The barrier of regulatory issues is a shifting target which is continually changing, yet the fines and penalties for non-compliance are on the rise. These regulations render it more difficult to meet increasing customer requirements for reliable product delivery, and make it challenging to be able to plan using normal lead times, inventory requirements, and scheduling.

An understanding of the different regulations worldwide, for import and export, is making it more and more difficult. Countries all have different standards, different registration procedures, and duties and freight can be punishing to foreign-made products. For example on country of origin discussions, if we buy something in China, and package it here – Mexico could also have tariffs on it because the majority of the value-added is here, not in China. Free trade is a myth! Duties can be anywhere from 0 to 100%, and you have to dig into trade agreements that all the countries have with one another to understand the landscape. And any country can change their mind tomorrow, and can retaliate for no reason. For example, there was a big fight between the US and Mexico over

the ability of Mexican truckers to cross US borders, which resulted in a retaliatory tariff on personal care products – our line of business! And yet we have nothing to do with truck driver regulations in Mexico! [US CFMG]

It is a problem getting product into Brazil. We need three different labels for Mexico, China, and India, and there are lots of import duties. In the international marketplace, few people are making WIP in China, and sending it to another country, then back to China for sale. There are not many that are exporting products, finishing it, and shipping back into China. We are struggling to get into our own supply chain to sell into these international markets. And to make it worse, one dollar in fuel cost change translates into $350-400K per year in our global transportation cost footprint. [US Consumer goods]

We have had to design different logistics networks aligned with volatile regulatory and strategic issues. For regulated countries, our target is to be in a lean position to set up a Completely Knocked Down (CKD) operation to take advantage of local production over imported costs. A CKD operation is one where you ship all parts and components to an overseas plant, and it is assembled there in a very lean production process for local sale. This is done purely for customs and tax reasons in countries such as Thailand, India, Vietnam and Europe, and is not at all a strategic production footprint. But to manage these countries, we have an entire logistics process which includes the Bill of Materials, parts calculation processes, ordering process, parts receiving, and components, and then have external service providers stuff it all into boxes, ship it by sea into the CKD plants. In all other countries where we do not have such obstacles, we export completely built unit vehicles into that country. For larger markets, we have overseas production plants which have a strategic production footprint aligned with our global transportation networks and external service providers. [German automotive]

Government regulations will continue to have important implications for companies operating in China. The government still plays an important role in business logistics activities through legislation, policy and standards development. On one hand, government initiatives will push the logistics industry to improve its infrastructure. However, there is a strong likelihood that the involvement of multiple government agencies at multiple levels will produce mixed and often conflicting guidelines for organizations. Without coordinated planning, many of the logistics initiatives will not result in expected outcomes. [Chinese Five Year Logistics Plan author]

The duties and tax rates in Brazil are extremely high and add up to about 70% of import costs. Moving elements around in Brazil from a tax standpoint is very difficult – the government wants you to track every event and keep track of every move. When you think about the supply chain solution and channels for retail, understanding the assortments you want to offer is difficult. There is a thought at the moment that we could service Brazil from a cost and service standpoint from Europe. That may not make sense – why not from Panama – it is closer! But if you look at trade lanes and transportation costs – there is a larger trade lane from Milan to Sao Paulo then from Panama! There are many different trade factors and we are hoping to get our retail locations in Brazil open in two years. [US CFMG]

We import many of our drugs from Europe, and re-pack a lot of pharmaceutical product in Brazil. The biggest challenge is presented by the regulatory issues dictated by the National Health Surveillance Agency (Anvisa – the Brazilian government agency equivalent to the US FDA). In July 2012 Brazilian regulatory officials, including Anvisa, went on strike, and this lasted over 40 days. We were obligated to store our product, and this became a major problem as we are not allowed to import products that have less than six months shelf life. Some of the Anvisa requirements make sense, but others are completely unrealistic. For instance, the agency will not approve a lot of the suppliers we require to ship to all of the locations in Brazil. We need over 1000 road freight carriers, but the Brazilian government agency (Anvisa) will only approve 10. We also don't have a lot of options to integrate shipments from air, water, road, and rail, as the infrastructure in Brazil is a major bottleneck. [Brazilian pharmaceutical]

It is hard to design a strategy to source globally, as the import duties, taxes, etc. are changing every month in Brazil. Unless you have friends in the government office, you just don't know what is happening. Last year in September 2011, the government increased the import duties on cars by 35% with no advance warning. I was negotiating with the Chinese to build a new operation in Brazil, and overnight things changed. We also have strikes every year in government that impacts airports, ports, etc. It used to take one day to clear customs at the airport. Now it takes one week. So we have to build a strategy knowing this will happen. We have specific rules for the size of inventory for a part, and rules for deciding whether to source it abroad. I won't buy a part with a 10% savings, because I don't know what will happen with the tax. [Brazilian Manufacturer]

We have a regional network, and have to limit our DCs to certain US states because of tax reasons. Tax laws are impacting e-business, as states seek to impose sales tax for shipments that occur from DC's in their state to customers in their state, and loopholes are beginning to disappear. We try to maintain a regional presence for inventory to allow next day delivery to major population centers. We keep adding product lines that started with domestic distributors, and once it hits some economy of scale, we purchase directly from manufacturers and import their products directly. And as we import more from China, we have to start using a consolidator to maximize cube on containers that are coming across. One of the key areas that we struggle with is the freight on ocean containers, and how many truckloads we need for different lanes and domestic regions. This is especially challenging in 2013. [US online retailer]

Other important trends

The aforementioned trends were ranked as the most important ones. Although not ranked as important by all survey participants, a number of other trends were also highlighted by several managers in our interviews and are worth discussing.

First, **sustainability** has become a trend worldwide. Executives recognize that materials used along the supply chains of their products can contribute to both resource scarcity and the climate change. Government regulations, retailers, and consumers are increasingly demanding products that are “green” and “social”, which also applies to logistics and supply chain processes. Moreover, companies have increasingly learned that they need to be concerned about social issues in their supply chains (e.g. labor conditions, child labor, and safety of staff), as incidents can harm their reputation and, thus, their performance. Measuring social and environmental performance along the supply chain is often very difficult. Many customers want sustainable products and services, but are not willing to pay a premium for this characteristic.

Second, companies are facing **increased risks and disruptions**. Such problems might be triggered by events that occur internally within the company. However, catastrophes like the 2010 volcano eruption in Iceland, the 2011 Tohoku earthquake in Japan, the 2011 Thailand floods, and the 2013 horsemeat scandal indicate that many companies are indirectly affected by risks that occur on the premises of their suppliers or even their suppliers’ suppliers. The existence of such risks and disruptions point to the fact that logistics and supply chain management is about a network of companies, which cannot be controlled by a single company, but in which all included companies positively or negatively can influence one another. In addition to such unexpected events, supply chains can also be vulnerable to everyday risks such as supply and demand fluctuations or delays.

Third, **new technologies** are emerging that can help to improve products and services and that may also help to open up new sales and distribution channels. This includes hardware and software solutions to improve integrated planning processes or social media and smart applications to reach new customers. Furthermore, logistics is influenced by digitization and decentralized IT network intelligence. Many companies have to make decisions between traditional or slightly improved technologies on the one hand, and highly innovative technologies whose benefit has yet to be demonstrated on the other hand. However, investments in technologies can be expensive. Therefore, companies are constantly challenged to rapidly recognize, evaluate, and potentially invest in new technologies to outperform competitors.

Finally, global companies have to cope with **poor logistics infrastructure** that can be found in several countries, **government regulations** that negatively impact local or transnational logistics processes, or **cultural issues** that typically will occur when people from more than one country work together. It is important to note that such trends often reveal themselves only after companies start to extend their business to other countries. These trends can substantially contribute to the complexity of logistics and supply chain processes, and they are, therefore, important to be considered before entering a new market and globalizing supply chains.

Sector Specific Trends

We identified some differences in trends by sector that are unique to these areas. These trends may be due to industry-specific issues, which we identified by segmenting the sample by sector and region, and performing more in-depth analysis. We begin by discussing manufacturing trends, followed by retail and LSP-specific trends.

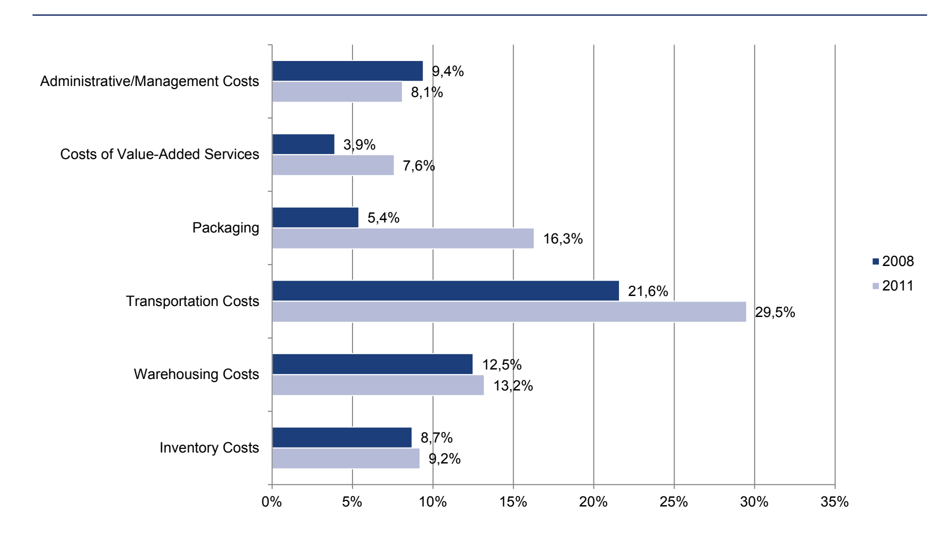
Manufacturing

Manufacturers in the sample emphasized how customer expectations and a networked economy are the biggest trends on the horizon. As manufacturers have worked on reducing working capital and "leaning" their supply chain inventories, plant operations are more dependent on reliable inbound material shipments than ever, and are more closely connected and dependent on key suppliers and LSPs to keep their operations running. At the same time, more manufacturers are putting inbound shipments "on the water" in an effort to reduce costs. With more companies sourcing globally, transportation cost has increased dramatically into the equation, as has the increased risk of disruptions. Organizations are recognizing that Low Cost Country sourcing strategies often have a downside, in the form of increased disruptions, material shortages, plant shutdowns, and reduced throughput. This is particularly true as manufacturers note that volatility will continue to increase in the next five years. Many of the manufacturers we interviewed noted that port strikes (such as the threat of West Coast and East Coast port strikes in the US in December 2012), cross-border inspections, and natural disasters all led to greater unpredictability of logistics services being on-time and in-full. A good indicator is that logistics is much more involved in supply management planning (83% of responses), but much less so when it comes to outbound customer selection (22%). This reflects an increasing concern, but arguably logistics still has inroads to make in terms of engagement in S&OP (68%) and product assembly planning activities (46%).

In Germany, for manufacturing companies, transportation costs account for 29.5% of logistics costs. These are considerably larger figures than in our last study in 2008 (see Figure 14). Packaging costs have risen since our last study, perhaps due to increased levels of protective damage prevention requirements during shipping. (Note that the figures do not add to 100, as "other costs" are not included in this figure).

An increase of logistics costs was already expected in our 2008 study. It turns out that the increase of the overall logistics costs can mainly be explained by the increase in transportation costs, which can be observed globally due to factors such as higher energy prices, high crude oil prices, additional movements of goods, or increased electronic commerce.

In our previous 2008 study, we asked German survey participants to estimate the value of key performance indicators related to logistics for their respective companies. In our new study, we asked for the values for (1) delivery time, which refers to the number of days from an incoming order until the time of actual delivery to the customer, (2) delivery reliability in terms percentage of goods that are delivered on-time, (3) delivery flexibility as the period of time between the last possible moment to change an order and the delivery date, and (4) cash-to-cash time, which is the period of time between the payment of suppliers and receipts from customer. A comparison between responses from 2008 compared to 2012 for several selected industries provides a number of important insights in the tables that follow.



14 | Components of Total Logistics Costs for German Manufacturing Firms

2012	Latecomer	Catch up	Typical	Advanced	Best in Class	Median
Delivery time (days)	> 35	≤ 35 – > 15	≤ 15 – > 5	≤ 5 – > 2	≤ 2	8,5
Delivery reliability (%)	< 90	≥ 90 – < 97	≥ 97– < 98	≥ 98 – < 100	≥ 100	98
Delivery flexibility (days)	> 14	≤ 14 – > 3	≤ 3 – < 2	≤ 2 – < 1	≤ 1	3
Cash-to-Cash (days)	> 50	≤ 50 – > 30	≤ 30 – > 21	≤ 21 – > 7	≤ 7	29,5
2008						
Delivery time (days)	> 12,8	12,8 – > 10	10 – > 5,8	5,8 – > 3	≤ 3	9
Delivery reliability (%)	< 93	≥ 93 – < 97,2	≥ 97,2 – < 98	≥ 98 – < 99,4	≥ 99,4	98
Delivery flexibility (days)	> 10,6	≤ 10,6 – > 6,4	≤ 6,4 – > 3,8	≤ 3,8 – > 1,7	≤ 1,7	5
Cash-to-Cash (days)	> 84	≤ 84 – >30	≤ 30 – > 24	≤ 24 – > 10	≤ 10	30

T1 | Key Performance Indicators for the German Automotive Industry

2012	Latecomer	Catch up	Typical	Advanced	Best in Class	Median
Delivery time (days)	> 45	≤ 45 – > 14	≤ 14 – > 4	≤ 4 – > 2	≤ 2	7,5
Delivery reliability (%)	< 80	≥ 80 – < 95	≥ 95 – < 98	≥ 98 – < 99	≥ 99	95
Delivery flexibility (days)	> 14	≤ 14 – > 1	≤ 1 – > 5	≤ 1 – > 1	≤ 1	2
Cash-to-Cash (days)	> 60	≤ 60 – > 49	≤ 49 – > 30	≤ 30 – > 20	≤ 20	37,5
2008						
Delivery time (days)	> 31,2	≤ 31,2 – > 8,2	≤ 8,2 – > 3	≤ 3 – > 1,32	≤ 1,32	5
Delivery reliability (%)	< 90	≥ 90 – < 94,4	≥ 94,4 – < 95,3	≥ 95,3 – < 98	≥ 98	95
Delivery flexibility (days)	> 3	≤ 3 – > 2	≤ 2 – > 1	≤ 1 – > 1	≤ 1	1
Cash-to-Cash (days)	> 102	≤ 102 – > 84	≤ 84 – > 60	≤ 60 – > 23,6	≤ 23,6	60

T2 | Key Performance Indicators for the German Chemical and Plastics Industry

In Table 1, a 2008/2012 comparison of key performance indicators related to logistics is depicted for the German automotive industry, an important industry in that country. (These tables were created by comparing prior BVL Trends research data from Germany to the current German dataset from the present study.) The median values for the four indicators remained almost the same, indicating a high degree of industry standardization around logistics performance requirements.

The respondents were grouped in five quintiles ranging from best-in-class companies to "latecomers". In 2008, the upper bounds of the delivery time of a "typical" and a "catch-up" company in the German automotive industry were 10 and 12.8 days, respectively. In 2012, after some years of economic disturbances worldwide, these values increased to 15 and 35, indicating deterioration in performance. This may be due to the increasing global footprint of automotive companies and their susceptibility to logistical challenges in this environment.

In 2008, performance for German automotive companies (median values for delivery time and delivery reliability) was significantly higher than that of companies from the German machine and plant engineering industry. In 2012, this difference has shrunk, indicating that the machine and plant engineering industry are also tightening logistics demands on their supply chain. The complexities of typical products in these industries also have an influence on KPI performance.

2012	Latecomer	Catch up	Typical	Advanced	Best in Class	Median
Delivery time (days)	> 29	≤ 29 – > 10	≤ 10 – > 5	≤ 5 – > 2,5	≤ 2,5	8,5
Delivery reliability (%)	< 81	≥ 91 – < 95	≥ 95 – < 98	≥ 98 – < 98	≥ 98	96
Delivery flexibility (days)	> 7	≤ 7 – > 4	≤ 4 – > 2	≤ 2 – > 1	≤ 1	3
Cash-to-Cash (days)	> 86	≤ 86 – > 41	≤ 41 – > 30	≤ 30 – > 30	≤ 30	32,5
2008						
Delivery time (days)	> 16	≤ 16 – > 5	≤ 5 – > 3	≤ 3 – > 1,36	≤ 1,36	5
Delivery reliability (%)	< 90	≥ 90 – < 95	≥ 95 – < 95	≥ 95 – < 98	≥ 98	95
Delivery flexibility (days)	> 2	≤ 2 – > 1	≤ 2 – > 1	≤ 1 – > 1	≤ 1	1
Cash-to-Cash (days)	> 66	≤ 66 – > 55,2	≤ 55,2 – >36,4	≤ 36,4 – > 30	≤ 30	40

T3 | Key Performance Indicators for the German Electronics Industry

2012	Latecomer	Catch up	Typical	Advanced	Best in Class	Median
Delivery time (days)	> 56	≤ 56 – > 20	≤ 20 – > 5	≤ 5 – > 2	≤ 2	15,5
Delivery reliability (%)	< 85	≥ 85 – < 95	≥ 95 – < 96	≥ 96 – < 98	≥ 98	95
Delivery flexibility (days)	> 28	≤ 28 – > 5	≤ 5 – > 2	≤ 2 – > 1	≤ 1	3
Cash-to-Cash (days)	> 60	≤ 60 – > 45	≤ 45 – > 30	≤ 30 – > 15	≤ 15	42,5
2008						
Delivery time (days)	> 132	≤ 132 – > 79	≤ 79 – > 11,2	≤ 11,2 – >2,8	≤ 2,8	28
Delivery reliability (%)	< 94	≥ 94 – < 95	≥ 95 – < 96,2	≥ 96,2 – < 98	≥ 98	95
Delivery flexibility (days)	> 60	≤ 60 – > 18	≤ 18 – > 12,2	≤ 12,2 – > 1	≤ 1	14
Cash-to-Cash (days)	> 96	≤ 96 – > 60	≤ 60 – > 42	≤ 42 – > 28	≤ 28	55

T4 | Key Performance Indicators for the German Machine and Plant Engineering Industry

Retailers

Retailers' number one trend today is increasing cost pressure. In a downward economic cycle, consumers are particularly cost-conscious. As the Eurozone crisis has gripped many countries, unemployment has been rising, and consumers have much less disposable income. This has forced retailers to cut prices and push promotions much more aggressively to lure people into their stores.[7] Consumer spending cuts has been the most severe in the hardest-hit countries of the 17-nation currency bloc, including Greece and Portugal, but has also spread to France and the UK. In the US, retailers have also felt the pinch of low economic growth and continued consumer cautiousness and low optimism about the economy. This has most directly impacted retailers margins.

Interestingly, retailers also note cultural challenges as a big issue, particularly in the consumer goods sector. Many consumer goods companies are struggling to keep up with consumers' shifting and fickle tastes as they expand into new regions. For example, several retailers have failed miserably as they grow into new countries, due to a lack of understanding of consumer demographics and preferences. This may, in part, be due to the fact that logistics is only engaged 22% of the time in customer selection decisions, and arrives "too little, too late" with little ability to influence logistics design issues.

The biggest perceived change identified by retailers is the increasing customer expectation for customized delivery services. The increase of e-commerce has been viewed as both a threat and opportunity to retailers. Retailers in the US have started to offer compelling physical stores as well as online portals that allow customers to shop from phones or computers, and pick up the merchandise in stores as well as their home. This trend has been labeled "omni-channel" logistics. Some even predict that Internet-only companies will need to establish a more physical presence or they will have service problems. Retailer experts say the shift, if done right, can give store chains a competitive edge over online-only rivals, allowing them to ship longer during the holidays and save costs, and to enable same-day delivery. But filling orders from both stores and DCs adds new layers of complexity, as pack and ship operations can disrupt in-store shoppers. Shipping from stores is also three to five times more costly, but provides other inventory benefits. For example, it might be more profitable to ship from a store farther away from a customer if it has slower-selling inventory. The strategy can increase the amount of inventory the company can offer online, improve working capital, and increase profit.[8]

Another trend for the retail e-commerce sector is the race to lock in consumers with door-to-door and even door-to-office customized deliveries that make them more concierge than delivery service.[9] For example, UPS is pushing a service called My Choice that sends multiple digital alerts and updates about when to expect pending deliveries. For a premium fee, customers can instruct the UPS driver mid-route where to put the package, or to re-route it to a different location. The service was introduced earlier but UPS only began marketing it in September 2012. Meanwhile FedEx is emphasizing to consumers that they offer Saturday delivery (unlike UPS) and also offers deliveries in the evening or "by appointment" same day across the city or across the US, all for varying fees. It also offers alerts, package tracking, and free re-routing of packages. Both companies are responding to the fact that residential parcel deliveries are growing faster than deliveries to businesses, growing at a compounded growth rate of 7% since 2000, compared to business volume that declined at a compound growth rate of 1.8% in the US. But to ensure profitability, companies need to deliver as many packages to as many homes in each neighborhood they visit, as residential deliveries are more labor intensive than higher volume business deliveries. In addition, a survey conducted by UPS revealed that package delivery plays a pivotal role in online shopping behavior. Online shoppers indicated that free or discounted shipping was weighed almost equally with the price of the item they were buying in their purchase decision, and 54% said they decided not to purchase because delivery would take more than five days. About 43% expect delivery in two to three days. This effort to reduce "cart abandonment" (not completing the buying transaction for items in one's cart) for e-commerce sites is driving UPS and FedEx to offer shoppers more control over arrival times and delivery locations. But this is proving to be very difficult. For all their logistical savvy, large LSPs are having difficulty in streamlining the residential delivery business to meet customer expectations.

In retail, median values of key performance indicators are, in average, similar between stationary ("bricks and mortar") retailers and mail-order retailers. There are considerable differences for latecomers between these two groups for delivery reliability (Table 5). Typical challenges for mail-order retailers are same-day deliveries and reverse processes, but also the question about whether or not to outsource logistics processes to a service provider.

Stationary	Latecomer	Catch up	Typical	Advanced	Best in Class	Median
Delivery time (days)	> 24	≤ 24 – > 9	≤ 9 – > 3	≤ 3 – > 2	≤ 2	4,5
Delivery reliability (%)	< 81	≥ 81 – < 90	≥ 90 – < 95	≥ 95 – < 98	≥ 98	95
Delivery flexibility (days)	> 14	≤ 14 – > 6	≤ 6 – < 1	≤ 1 – < 1	≤ 1	2
Cash-to-Cash (days)	> 42	≤ 42 – > 30	≤ 30 – > 30	≤ 30 – > 10	≤ 10	30
Mail order						
Delivery time (days)	> 41	41 – > 19	19 – > 5	5 – > 3	≤ 3	10
Delivery reliability (%)	< 90	≥ 90 – < 95	≥ 95 – < 95	≥ 95 – < 98	≥ 98	95
Delivery flexibility (days)	> 12	≤ 12 – > 8	≤ 8 – > 2	≤ 2 – > 1	≤ 1	2
Cash-to-Cash (days)	> 64	≤ 64 – >30	≤ 30 – >30	≤ 30 – > 13	≤ 13	30

T5 | Key Performance Indicators for Different Types of Retailers (2012)

Logistics Service Providers

Like retailers, logistics service providers (LSPs) also emphasize how cost pressure is high today, but note that in the next five years, a much greater challenge will be the increasing level of customer expectations for specialized logistics services. LSPs recognize the importance of new technologies in identifying solutions to the problems raised by increasing global complexity.

Several individuals noted in interviews that customers now “expect” LSPs to provide technology solutions that provide global network visibility. That is, many customers also expect such services to be provided “for free”, and are often unwilling to incur extra fees to cover the investments of such technological innovations as GPS tracking, order tracking, inventory visibility, electronic advance ship notices, etc. In such cases, LSPs are having to provide technology investments as a bundled service to customers, and need to develop innovative strategies to build improved insights into LSP activities.

Customers recognize the importance of LSP customer service in considering new providers and tenders. As an example, one company we met with established an LSP scorecard that identified a number of important attributes under consideration. Some of the most important on this list included quality (on-time delivery, delivery flexibility), documentation accuracy (accurate and on-time), management capability (dedicated people with experience), and technology capabilities (track and trace, EDI). Although cost was important, it was not the most heavily weighted dimension of performance. This is an important shift for LSPs to consider as customers are requiring more service-based capabilities, not just the lowest price. LSPs must find a way to document and market their capabilities to new customers, as customers are becoming more aware of total cost of ownership and recognize that the lowest priced LSP is not always the lowest total cost in terms of impact on performance.

Strategies Addressing Logistics Trends

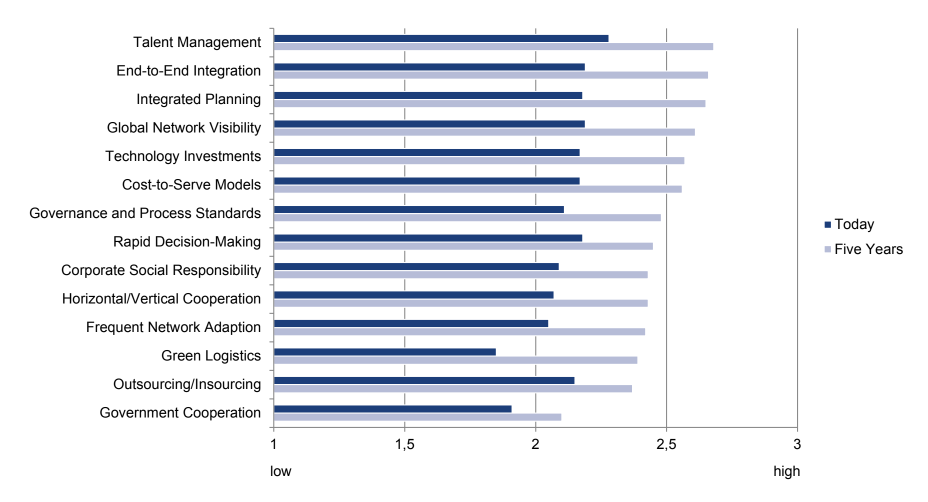
Top Logistics and Supply Chain Strategies

In the last section, we discussed trends that exist in logistics and supply chain management. As shown in Figure 15, companies are responding to these trends in a number of ways. The single most important strategic initiative, both today and in the next five years, will be talent management, which includes the need to fill critical gaps that exist in the logistics workforce in the next decade. After talent, organizations are seeking to build capabilities in supply chain end-to-end integration, network visibility, integrated planning, technology investments, and cost-to-serve analytics. The last element refers to the ability to accurately portray the true costs of service to different customer or product profiles, which is an important element for logistics decision making.[10] The other strategies are also identified as important, although are not as important relative to these top six.

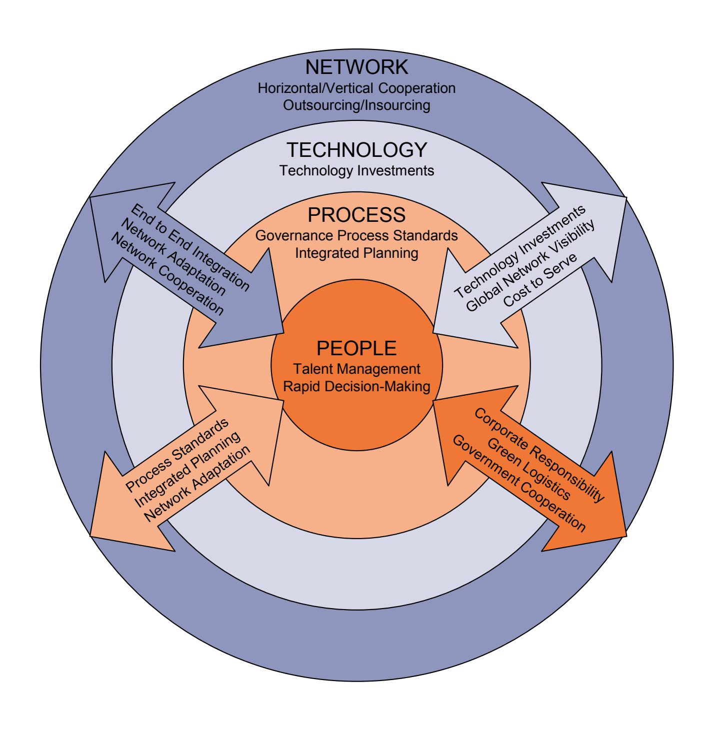
How can managers interpret these results? In the remainder of the report, we represent the results in a model that provides actionable strategies for logistics managers to consider as they roll-out strategic plans in 2013 and beyond.

As noted in the sidebar on the next page, top performing organizations are not as concerned as others about the challenges of increasing government regulation, talent shortages, or poor logistics infrastructure. Our research leads us to believe that top performers are in fact embracing complexity, and using these environmental factors as opportunities to build capabilities that will create a sustained competitive advantage. They have established strategic initiatives that have created an ability to confront, manage, and in some cases, exploit the challenging issues that exist when building the global logistics network.

The approaches taken by leading companies are multi-pronged in nature, and do not consist of a single approach. The graphical representation of strategic organizational capabilities is shown in Figure 16, which demonstrates the multiple capabilities that top performing organizations are seeking to develop in the next five years. First, organizations are able to quickly adjust and shift direction in response to a complex and changing environment. A responsive organizational culture relies at its core on a highly capable and trained workforce (PEOPLE). People



15 | Rating of Logistics Strategies in Importance (5 = Important)



16 | A Model of Logistics Strategies

are the foundation of any organization, and top performers have established a commitment to talent management, thus ensuring their people are engaged and empowered to respond to difficult and unstructured situations Second, top performers have constructed a global governance process that holds people to a standard of conduct and behavior, emphasizing integrated planning but with enough room to maneuver around regional issues that confront their global business unit (PROCESS). Process standards ensure that there is a global set of policies and procedures that drives the right outcomes, but also emphasizes that plans must be properly aligned throughout the supply chain. Third, they have developed long-term technology investment roadmaps that are aligned with their core strategic initiatives and customer expectations, which drive a better ability to price products and services effectively and establish services that meet or exceed customer expectations (TECHNOLOGY). Investments in technology are made with the intent of allowing people to make better decisions in an integrated manner, and are always considered in light of customer outcomes. Fourth, leading performers have established a precedent for creating network partnerships, outsourced relationships, and bundled products and services with key global partners that provide an improved set of capabilities extremely difficult to replicate (NETWORK). Organizations recognize that they cannot "do it alone", but that those with the most capable network of suppliers and logistics partners will win in the end. This requires defining a culture that builds trust and cooperation within global networks, which takes time to achieve. Finally, top performers have established a commitment to improving the global community with a plan to leave it in a better condition than when they began, both in terms of carbon footprint and global standards (COMMUNITY). In this study, we view strategic initiatives to drive green logistics trends, improve labor and human rights conditions, and drive ethical decisions as an integrated component of the environment in which organizations operate. Implicit in this position is the concept that the local Community is an integral component of your logistics network. For that reason, we describe efforts by organizations to improve their COMMUNITY in the NETWORK section of the report. By investing in green logistics and emphasizing labor and human rights, these organizations will reap the rewards of these investments in the years to come.

We identify the strategies that are implicit in the model shown in Figure 16 that organizations are seeking to build, and provide specific examples from interviews and from our survey that illustrate these strategies in action. In each section, we will also show how the strategies are directly addressing specific trends identified in the earlier section of the report. This is validated through statistical analysis of the survey results.

Each figure includes a set of statistical values indicating the correlation of each trend and strategy discussed in that section. For example, in Figure 17 a 0.20 correlation exists between globalization (a trend) and talent management (a strategy). In general, correlations provide evidence of a relationship between a trend and a strategy, but do not imply causation. In each section we also describe specific elements that distinguish top performing companies. We conclude with some industry-specific results, as well as some regional results.

Top Performers Embrace Complexity – Identifying Top Performing Companies

We segmented our sample to identify top performing companies, beginning by segmenting the sample into manufacturing, LSP, and retail companies. According to our survey results, one of the most important elements in logistics today is delivery reliability, often defined as "on-time delivery", "on-time in full (OTIF)", or its converse measure, "out of stock (OOS)". Companies who consistently meet delivery schedules in the face of complexity, and achieve this without extraordinary investments in working capital, have developed capabilities to manage a complex logistics environment. As such, we segmented companies in each of the three industry samples into those with the top quartile in performance. Top performers were ranked and sorted based on several criteria: ***Delivery reliability, number of customer complaints, and cost savings.***

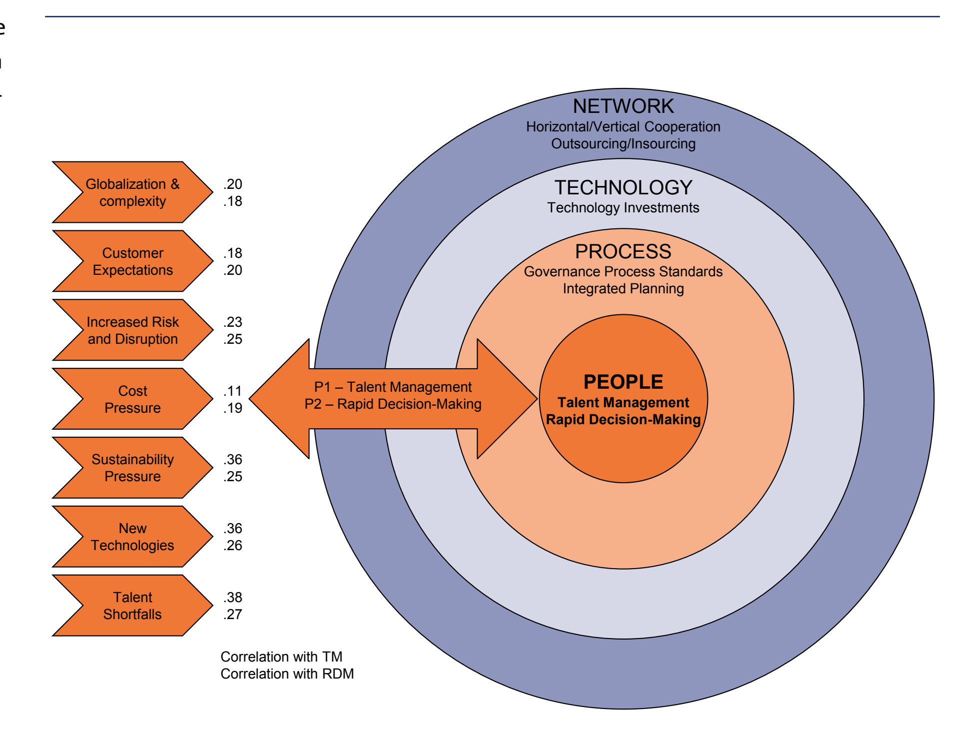
Based on our segmentation, we discovered that top performers were NOT as concerned about complex challenges associated with the impact of government regulation, talent shortages, and poor logistics infrastructure. Top performers indeed appear to be embracing these changes, and had identified ways of exploiting these issues perceived as major barriers by other companies. The results suggest that organizations who consistently meet their logistics commitment, and who manage complexity through alternative logistics strategies, are able to convert these capabilities into financial benefits in the form of increased market share revenue and reduced costs.

As companies confront an increasingly complex global logistics environment, leading organizations are not only aware of these challenges, but have come to effectively embrace them. In fact, we discovered that ***top performers*** *are less likely to see the major barriers identified in the Trends section of this report as challenges. We have identified other differences in strategies that differentiated top performers, and have noted these in different sections of this report.*

People

Managing and leading PEOPLE is at the core of logistics strategies, and as such is shown at the central core of the organizational capability model. In the end, no organization will be successful without recruiting, training, retaining, and enabling their people. As shown in Figure 17, managing people in this context involves 1) developing a talent management strategy for the future that explicitly recognizes the gaps ahead, and 2) creating an organization culture where rapid decision-making is not only encouraged, but facilitated and developed.

We noted correlations between several trends (global complexity, increased risk, cost pressure, sustainability outcomes, emerging technologies, and talent shortages) and the deployment of PEOPLE strategies identified here. It was evident from our data that organizations embracing complexity are establishing PEOPLE as a top priority in the next five years, and this report provides some clues as to the important activities that will matter.



17 | PEOPLE: Having the Right People Empowered to Act and Deal with Logistics Complexity, Corporate Sustainability, and Ability to Learn New Technologies is Fundamental

Strategy P1 – Talent Management Is Essential for Embracing Complexity

Every one of the executives we spoke with recognized the importance of having capable people in the organization, and the need to develop a plan that would lead to better managerial decisions. While everyone noted that talent is important, we found relatively few companies that had a well-developed talent strategy, that considered the key elements of not only talent hiring, but also development, succession planning, retention, and mentoring.

A recent Hackett Group study found that supply chain management functions in organizations polled are working concurrently on nearly 10 initiatives deemed as "critical" or "strategic" to the enterprise.[11] As such, people with project/program management skills, solid business acumen, analytical capabilities, and an ability to manage relationships are badly needed. To drive any transformation initiative, it is imperative that companies keep their staff engaged in those areas that are resource-intensive and value-added in nature. This means not only retaining the people who are key in leading these initiatives, but also building a pipeline of talent that will fill the emerging gaps in capabilities that are starting to appear in the organization. Establishing the right mix of new talent, seasoned veterans, and mid-career hires is a delicate balancing act that must be aligned with the right HR strategies to support this effort.

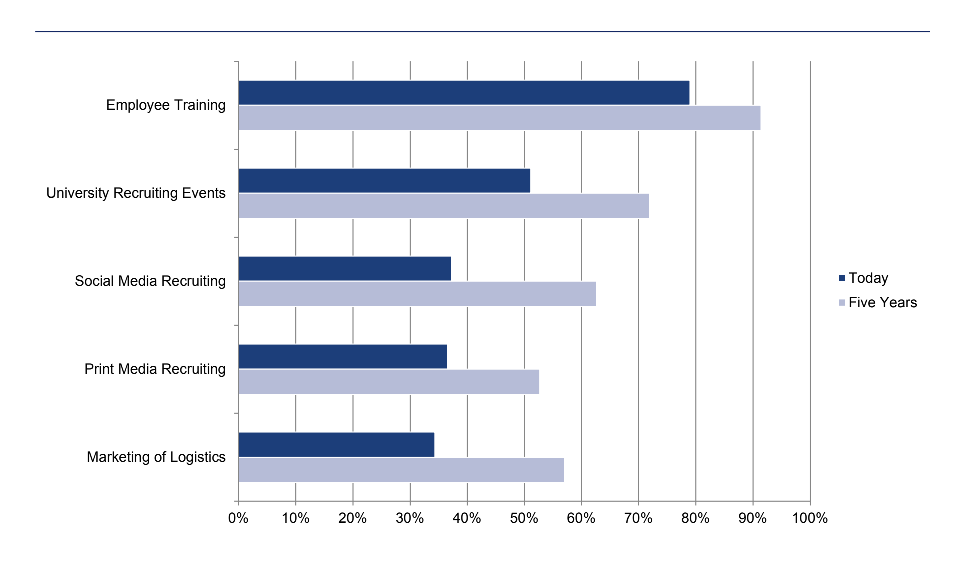
Developing talent is a long-term strategy that involves several core actions. It is important to view the talent pipeline as a highway – some people get on and will stay on the highway for an extended period, while others may exit quickly. Organizations need to have a strategy that explicitly identifies the talent shortfall ahead, and extrapolates to identify specific actions mapped to these gaps. Such actions constitute a plan that is set into motion in collaboration with the human resource organization in an enterprise.

In this regard, talent management involves utilizing common supply chain principles to the idea of "people as product", and thinking of them in the same way! For example, Peter Cappelli in his book "Talent on Demand" discusses viewing talent development as a choice between "make" (internal development) versus "buy" (external hires), and the importance of evaluating the costs of each alternative.

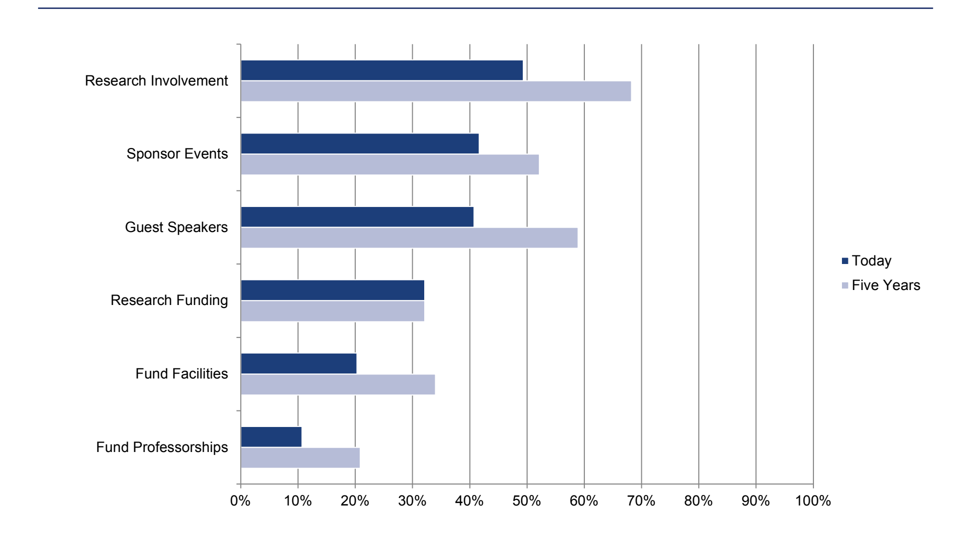
He also discusses the importance of building better talent forecasts through portfolio models on talent, improving the ROI on internal development through focused development projects, and developing a pipeline of talent based on modeling and challenging assignments.[12]

To build capability, a key strategy is to retain good people, and ensure you keep them on board through training. As shown in Figure 18, more than 90% of our respondents intend to increase employee training in the next five years, so this may not be a differentiator. It is also important to focus on the "onboard" ramp of the talent highway, particularly for entry-level and supply chain analyst/planner roles, through engagement with universities. And because so many young people are focused on social media, building a talent network through social media is a strategy that more than two-thirds of respondents intend to focus on. Finally, almost as important as social media recruiting, marketing the logistics profession to attract participants is an activity that spans multiple industries.

Partnerships with universities was an important strategy. Universities are not just a reliable stream of graduates for recruiting, but are a source of research projects that lend themselves to potential cost savings and innovation. More organizations are also considering funding of professorships in the future. As shown in Figure 19, organizations are dramatically increasing the level of research involvement with universities, to identify areas for collaboration.



18 | Talent Management Strategies Deployed (Percent of Respondents)



19 | Forms of University Engagement (Percent of Respondents)

Top Performers are Proactively Managing Talent

As noted earlier, top performers are less likely to perceive that talent shortfalls will be a major challenge in the years ahead overall. Specifically, top performers are less concerned about talent shortages in specific areas of expertise than non-top performers. (Because these top performers are better at managing talent, they are not as worried about it!)

Moreover, top performers are not as concerned about the shortage of skilled labor, entry-level logistics positions, and supply chain planners. We believe this is a function of proactive talent management strategies that are explicitly considering talent gaps, and organizational measures to address these shortfalls and address them.

Many of the executives we spoke with emphasized their talent strategies in the discussions we held with them. They viewed PEOPLE as a core foundational component in their future success.

The most important thing is to work on the capabilities of our people, and increasing the competencies. We have to hire people who are highly educated in terms of mastering complexity and being international in their thinking. At least two or three languages are required, of which one should be English. We prefer people who have studied in a foreign country. People who think Germany, the US, or their local city is the only place of significance are not the types we are interested in bringing into our organization.
[German Automotive Company]

We put a lot of importance on continuous training of our people right after the recruitment and that the good work that they have done gets recognized. However, in some capabilities, there is a different trend that we are seeing. In transportation and logistics we have a stable people structure and not so many people are coming and going. But in certain specific capabilities like material handling and warehousing we see higher fluctuation rates. There is also regional variation as turnover is higher in eastern India than in the western region. Internally, we have a development program where the top people in the organization go through a three year management development program that we jointly conducted with a university. Also we sponsor work with universities where we recruit personnel and work on research projects with them. We also launched another program recently, where we recruit a lot of engineering graduates, not from technical colleges, but from the next level of colleges, and we provide them with a two year program focused on supply chain management, trends and techniques so that they are developed into supply chain specialists.
[Indian LSP]

We have a widely used practice of bringing new inexperienced employees into the company for training. While we know the benefit of bringing in experienced veterans, we also recognize that veterans have more challenges adopting to a different corporate culture and generating creative new ideas. We believe that fresh college graduates who are trained from scratch also allow us to grow internally. In China, we have also strengthened ties with elite Chinese universities and have developed a selective hiring process.
[Global Electronics Executive]

Our talent development approach in Russia was unique. While we will hire engineers in China for their technical competence, we hire in Russia for their mindset, and willingness to learn. We hired all local talent out of the English translation school because of their strong work ethic and knowledge of the English language. And then we brought them to our Western locations and trained them there on our company mindset of how we do business and how we emphasize quality.
[Global Manufacturer]

People are the most crucial factor for success. We realized we had to move people out of their traditional functional silos (specialized skills but little business understanding) and have people interact more with other parts of the business. To make supply chain an equal function, it requires that they be able to really talk to other functions at that level, and not just as a support function. We also took customer service and moved it from marketing over to supply chain, which allowed us to manage inventory positioning with greater control.
[Global Chemical Executive]

I believe you need to have outstanding processes and reliable systems, and a very good HR talent development program. You need to have a certain backbone of your own talent which you develop, train and re-train, who may NOT be the next generation of key leaders. You can have low turnover at every level, positive or negative, so long as you keep that central cadre of B players along the way. They will not deliver 110%, but will reliably deliver 90% performance. Once you have that base, you can deal with the volatility of human capital. But you can also combat high turnover if you have a strong brand like we do.
[Global Chemical Executive]

Top Performers are More Engaged with Universities to Develop Talent.

What are top performing companies doing to prepare for the impending talent shortage ahead, and why are they not concerned? There is no single answer here, but the data provides some clues as to what companies are doing in this area.

Our research shows that top performing companies are much more likely to be collaborating with universities through funding of research projects, and are actively engaging their people with faculty and students in these projects. As an example, many companies are working with student teams on logistics problems that lead to specific recommendations and deliverables, at centers such as the Supply Chain Resource Cooperative (http://scm.ncsu.edu) at North Carolina State University funded by 15 companies. In addition, organizations are seeking to make their presence felt on campus, through classroom guest speaker opportunities, sponsoring events, and funding research. Fewer are funding facilities and professorships, but some organizations are actively involved in these activities when they see a return in terms of access to new thinking, logistics innovations, and bright students who are interested in working in their organizations. An example for that would be the logistics and supply chain management cluster consisting of three chairs at the Sino-German School for Postgraduate Studies at Tongji University, Shanghai (CDHK, http://cdhk.tongji.edu.cn) that are funded by three German organizations.

Strategy P2 – Rapid Decision-Making

A second component of managing people is instilling them with the authority and ability to make decisions quickly, and enable them to do so. With the rapid pace of change and the array of different supply chain problems that arise in complex global networks, organizations need to be able to establish a strong context for decision-making, yet rely on the individuals in decision-making roles to be able to act on their own. Multiple levels of approval for key decisions not only delays these decisions, but a window of opportunity for value creation can be lost. In many logistics environments, organizations are relying more than ever on the capability of their managers in remote locations to be able to make quick and rapid decisions, using the best available data, and applying established guidelines for the process. This is a challenging requirement, as it often requires a blend of independence and centralized guidance, a tolerance for ambiguity and a willingness to allow individuals to make mistakes. Only by taking decisions, making mistakes, and learning from those mistakes will individual managers learn and develop competencies in agile thinking and rapid decision-making. Rapid decision-making turns out to be particularly important in industries such as chemicals and FMCG.

Top Performers Seek Rational Specialists Who Think Long-Term Globally

An interesting result of our survey is that top performing firms are seeking a different type of logistics individual. Top performers indicated they prefer to hire and recruit individuals who have a strong rational and analytical foundation, as one of the most important characteristics. A second characteristic is that they want individuals who can consider the long-term impact of their decisions, not just the immediate future. Third, they prefer specialists who have deep knowledge in a specific area, as well as individuals who are prepared to work in a global setting (often with multiple language capabilities when possible). This is a unique combination to find in logistics managers, but aligns well with our previous observation of having individuals who can quickly grasp the dynamics of a specific logistics situation, apply analysis and rational thinking to the situation, and emerge with a clear solution that considers the long-term implications of the outcome. As organizations move globally, the need for a global perspective is also important, and this is increasingly harder to find. This represents a “tall order” for human resource specialists to identify and recruit these types of individuals, and emphasizes the importance of casting a wide net in multiple channels to identify them.

This observation was supported by specific comments made by individuals we interviewed during the course of this study.

We need to encourage and develop sound practicality in decision-making to gain speed. At some point in time, every manager really has to act. This involves a lot of pragmatic risk-taking and putting the guts back into decision-making. In a complex world, it is highly unlikely that you have the ability to get everything analyzed down to the ground level, and at a certain point in your intellectual development, there is a stream of clarity that occurs that results in a decision. We can't analyze things that cause us to paralyze. There is a probability that a decision is wrong, and the only manager who doesn't make mistakes is the one who doesn't make decisions. We need to treat mistakes as a chance to learn, and not put so much effort on feeling guilty.
[Global Automotive]

We largely adopt a decentralized approach and a lot of decision making takes place at the individual location level. Because we have very spread out operations in India (e.g. the distance between our sites in the north and the south can be up to 2,400 km), people in the different sites must be able to make their own decisions. They are integrated through common competency-based processes and an ERP system connects all sites. All transactions take place through this ERP system, so that the information about all implemented decisions is centrally available, even though decisions are made in a decentralized way. Customers expect rapid responses, and so centralized decision-making would take too long.
[Indian LSP]

One of the biggest challenges I've had in 11 years in this role is figuring out how to balance consistency in execution and tapping into the creativity and flexibility that I'd want if I was running a logistics facility. And so we have been in search of that right balance and there is no easy answer to it. If the principles of execution are consistent, we will have a consistently good result across the enterprise. It is not just the principles of elements such as engineering and setup, but we need everyone aligned on how things should work and how they work best. How do you teach that across our enterprise? If we could achieve this, our leaders will be more apt to approach similar problems from a similar mindset. I can't dictate everything from here, nor do I want to. Local and regional leaders are hired to run a facility, but there are principles around execution, engineering, process, people, and we want to see that come to fruition. We put in standards and incentives, and 70% of our associates are covered with engineered standards in our DCs. But we have different standards for different buildings, and the difference is in the setup! Our systems are very loose and not as structured as they should be, so we have deviation in process – and in the absence of systems – we have to teach principles.
[Large US Retailer]

A traditional central group falls short, but a totally decentralized decision framework won't work either, as you lose credibility across the product line. The matrix is the most effective, but also the most difficult to manage. We try to keep standards across divisions and product lines, but allow for a lot of flexibility in execution, because we are product focused.
[US Automotive]

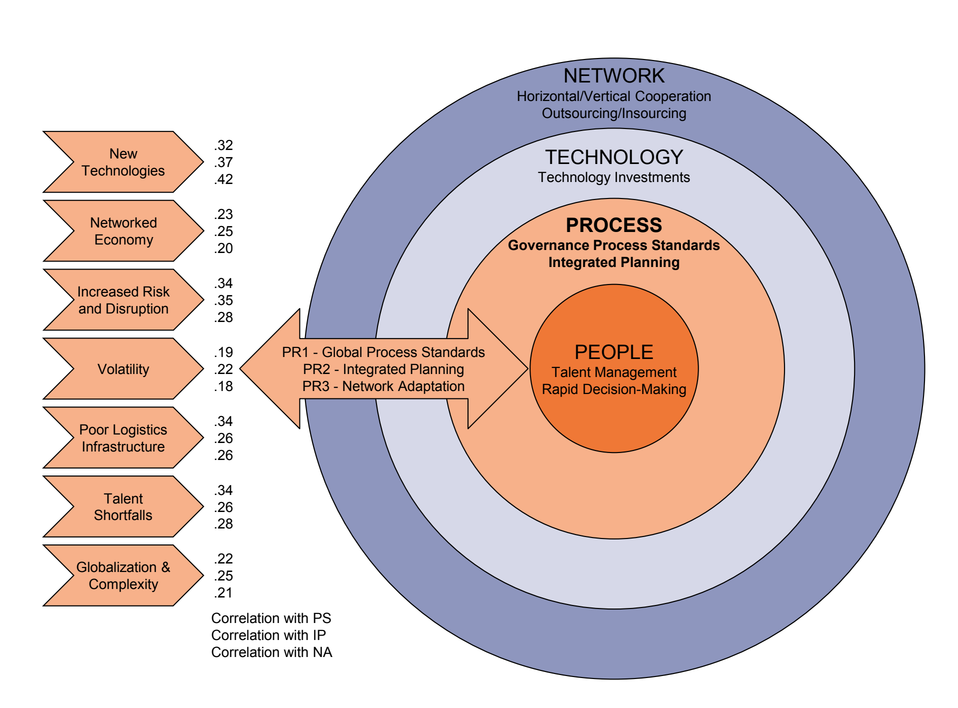
There is some level of what I would call the store and schematic level decision-making in our network. There is a collaborative and centralized process about how we think about that store, and the mix of SKUs of stores in that geographic region. But at the local level, operators can have a lot more control about how they think about product placement, what vitamins they put on end caps, etc. We are allowing a lot more customization to take place due to the diversity of customer needs locally. As we go further up the supply chain, we clearly provide corporate governance to our distribution network. Each DC is required to work with local operators to ensure the service expectation and the requirements for delivery frequency, mode of transportation, and event planning occurs in an integrated fashion.
[Large US Retailer]

It is a combination of centralization and decentralization – a hybrid. We put a lot of emphasis on our core values – our values in action. It is on the web – a worldwide code of conduct. And we say 4 things matter to us: Integrity, Excellence, Teamwork, and Commitment. If you are a manager anywhere in the world, these are the rules of engagement that are understood everywhere in the world we operate. Actions that go against that code won't be tolerated. Although we have many decentralized decisions, it is based on centralized values of the individuals in our supply chain organization. The focus is on maintaining a common culture and trusting that people will execute in a way that is consistent with that.
[Global Manufacturer]

Process

As shown in Figure 20, the second dimension that organizations are seeking to build with their movement to an integrated logistics transformation is a strong culture that emphasizes global process standards, integrated planning schemes between different parties in the supply chain, but with an ability to adapt to the network through aligned actions that are consistent with the approach. This is not an easy task. With the movement towards globalization, organizations find it is often difficult to create the right mix of global governance, process standardization, and alignment, yet continue to operate in a multi-cultural environment with many different customer requirements, logistics and delivery requirements, and diverse transportation infrastructures. As they work through this process, several are finding that a new type of agile logistics structure is needed. The ideal approach is one that combines 1) a global process standard and governance format to assess whether individuals are meeting the standard, 2) an integrated planning culture that ensures individuals in different parts of the world and different parts of the supply chain are planning using the same outcomes in mind, and 3) an ability to flex and adapt in the network given different requirements that exist.

These factors have a strong correlation with the trends shown in Figure 20. Specifically, there exist statistical relationships between PROCESS strategies and respondents' perceptions of increasing risk of disruptions and volatility in global environments. In addition, respondents who focused on process strategies also sought to deal with new solutions provided by mobile technologies and network structures, ensuring that processes were exploiting technology and network capabilities. Finally, well-defined process standards were being used to cope with the problems of increasing talent shortages, global complexity, and weak logistics infrastructures. Process strategies are dependent on having the right people who are able to deploy them. However, our research also developed some key insights on the characteristics of effective global logistics processes.



20 | PROCESS: Globally Integrated Adaptable Processes Provide a Means to Embrace Volatile and Complex Logistics Environments

Strategy PR1 – Logistics Governance and Process Standards That Allow Flexible Deployment

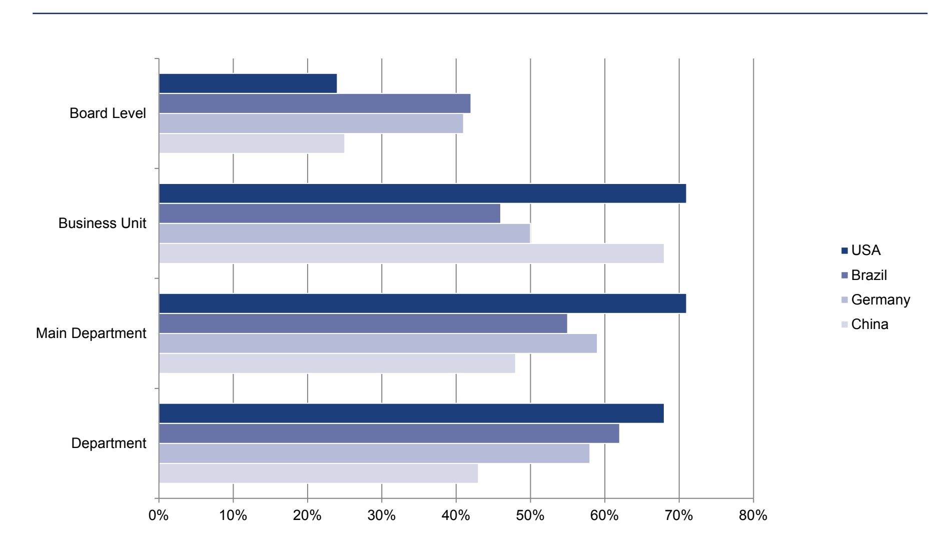
To drive a PROCESS culture, organizations need to ensure a high level of governance over global logistics processes. There has always been a need for organizations to establish standards of performance embodied in policies and procedures, but we also discovered that leading organizations develop a form of governance that allows some level of flexibility to adapt to local requirements. This is achieved by establishing a global standard in the form of a "maturity model" against which to measure outcomes and results.

For example, many of the organizations we met with have recognized regional logistics requirements are very different, and as such have moved to a regional logistics design. Such organizations are governed by a centralized Logistics & Materials Management Council. The council establishes overall guidelines and structures for regional divisions to operate at a world-class level. Typically such councils have developed standards consisting of three components: process, policy, and playbooks. First, the standards define the processes that must be in place (e.g. customer order promising, transportation planning, order fulfillment). Second, they define the policies that must be followed (e.g. finalizing orders, allocation, scheduling). Finally the standards come with "playbooks" that act almost as a user guide on how to think through the process requirements and get them done!

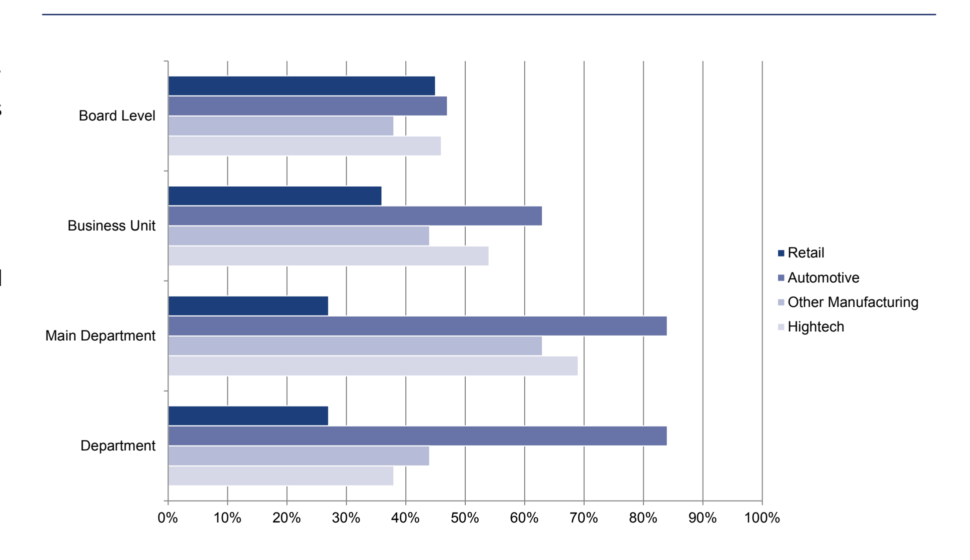
In cases when there are major tradeoffs or conflicts that occur between regional requirements, organizations have adopted a global sales and operations planning function to optimize global requirements across regional requirements, especially around global product lines. Once established, however, top executives realize that these plans will be interpreted and acted on differently at a regional level.

This approach is based on the simple thesis that logistics leaders cannot standardize the entire world, and need processes that will be a solution in 80% of the cases, allowing for local adoption for the remaining 20% of cases, (so long as the outcome meets the process playbook). This requires a clearly defined organization, with clear roles, and responsibilities, so that people can speak to the same processes, with the same toolboxes. This ensures that all parties are "speaking the same language" and are using comparable metrics and plans.

The position of logistics in the company's hierarchy is an indication of the level of influence logistics leaders have on key strategic decisions. Generally speaking, the higher the logistics role in an organization, the more likely logistics executives will have an influence on critical business decisions. For example, logistics decisions made at the board level confer high importance to logistics on subordinate levels.



21 | Logistics Representation in the Organization (% by Country)

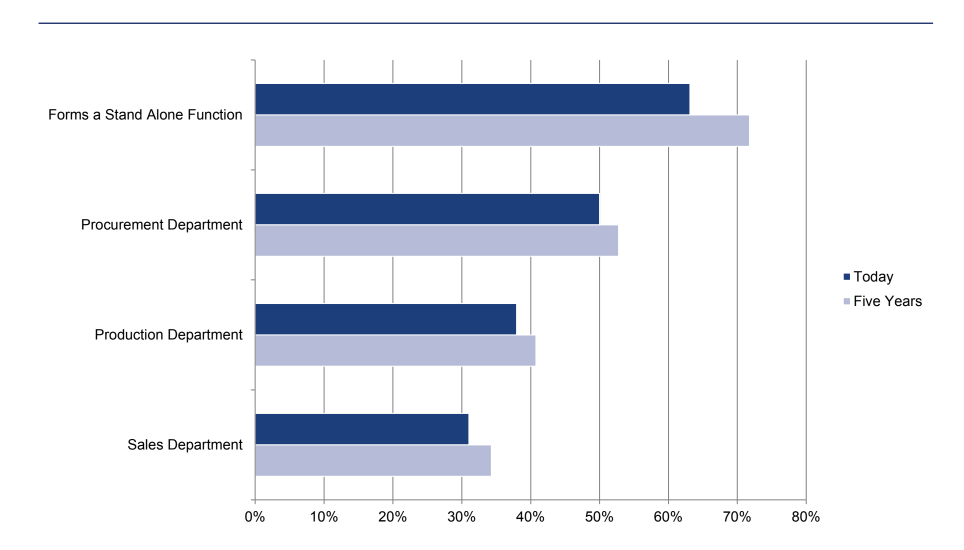


22 | Logistics Representation at Each Level (% by Industry)

In the past, manufacturing companies tended to consider logistics to be a centrally controlled business function. In particular, logistics was mainly seen as a part of a business unit/sector or it was even managed directly by the board, as our data collected in 2003, 2005, and 2008 indicate. In many firms, logistics was typically not anchored in a specific department responsible for that function. However, the percentage of companies that considered logistics to have representation at the board level decreased between 2005 and 2008.

Our new data show that companies who consider logistics to have representation on the board have become a minority. Indeed, logistics is now usually considered to be part of its own department or main department. Overall, when looking at our international responses, a small number of executives indicate that logistics has meaningful influence at the board level. The results suggest that firms increasingly tend to consider logistics as an auxiliary function with a stronger decentralized focus than in the past. However, as opposed to other business functions, logistics does not seem to have found its rightful place in the organizational hierarchy, as much diversity can be observed between different industries and different countries.

But what has shifted logistics away from the board level? Already in our last study, we observed that the board level tends to focus on logistics in order to expand its operations and, after expansion was successful, focuses on other areas again, such as strategy and finance. Considerable market turbulences in the aftermath of the economic crisis in 2008, might be the reason why CEOs did not pay as much attention to logistics as in prior years. Our hypothesis is that improving market stability could soon revert this trend, with an increasingly important and centralized role for logistics building within production networks.



23 | Percentage of Firms Stating Logistics is Part of the...

With respect to the role of logistics in the organization, substantial differences can be observed between different regions (Figure 21). In Germany and Brazil, the percentage of companies managing logistics at the board level is much greater than in China or the United States. One reason could be that the strategic importance of logistics has been particularly acknowledged in these countries. Irrespective of the strategic importance of logistics, in Germany logistics is traditionally more integrated in the companies' hierarchy due to the country's business culture.

When comparing this result across industries, it appears that logistics has a board level role more often in the IT and electronics industries, as well as in automotive and retail. Again, this is due to the important role that logistics plays as a component of total cost and customer services in these industries (Figure 22). More than several other branches, the automotive industry seems to have acknowledged the importance of logistics throughout the organization.

When we look only at the most important hierarchical level for logistics, companies from the chemical sector are twice as likely to have logistics at the business unit sector as at the board level. One plausible explanation for this is that this market is very fragmented. International chemical companies consist of many global business units which makes consolidation at the board level difficult.

Logistics still has a less significant role in organizations than is merited (in our opinion). Many logistics organizations are still located in a department or business unit. A large majority (>75%) will be a centralized department in the next five years, and more than half (57%) will play a role at the board level. Over time companies are slowly recognizing that logistics capability is an increasingly important ingredient that enables global reach and growth. Further, we are seeing a clear movement to logistics as part of a stand-alone function with close relationships to procurement and sales organizations (Figure 23). In more than two thirds of companies (>66%), logistics is a stand-alone function, and will grow to be a stand-alone function in more than 75% of respondents in the next five years. This too represents a key indicator that a decentralized approach to logistics is no longer effective, but that a top-down approach is important.

Top Performing Companies Employ a Stand-Alone Logistic Operating Model

An important difference between top performing companies is that logistics departments are more likely to employ a stand-alone operating model than being part of the procurement organization. Although procurement has often considered logistics as simply an activity to buy logistics services, there is a clear need to differentiate the logistics strategy that requires a specialized set of capabilities for managing this area of spend. We are much more likely to see closer coordination between procurement and logistics in these organizations, with logistics often playing a "consultative" role in defining solutions for procurement and for business units alike. Moreover, the responsibility of logistics sometimes goes far beyond the respective company, as it can include the extended end-to-end network.

This was reflected in several comments by logistics and procurement executives.

Our global pharmaceutical business today is 30-40% in emerging markets, and is the highest revenue pharmaceutical segment. We will see 75% of revenue move to emerging markets, which means we need to intensify our business footprint in each of these regions. We are in more than 165 countries, and work with some of the largest global retailers in the world, including Wal-Mart, Metro, Carrefour, and others. With this diversity, we have been faced with multiple logistics platforms, and our logistics networks have been very diverse. In our company, logistics resides under the global procurement function. With logistics, we are applying the procurement concept of supplier consolidation to drive towards a standard global architecture, which converges to a single platform, a single 3PL in each region, and the same metrics for assessing logistics efficiency. But this is challenging, as we are now moving away from the small players, and will rely more on the big third party network providers to step in and manage a greater proportion of our total spend in logistics. [European Pharmaceutical]

We know that what we do here in the US won't work in EMEA, and something else won't work in China to meet regional requirements and meet the customer expectation. So we are structured regionally to drive the deployment of our global strategies, to optimize freight flows, and deal with regionally-specific issues. [Global Manufacturer]

We went through a major European consolidation in 2007. At that time, any general manager could build a plant in his country if he wished, a highly decentralized approach. A centralization effort occurred where that decision was taken out of the hands of the country manager. We went through a major consolidation effort, which considered a cost focus initially, but which has moved more to a service focus, with an emphasis on logistics agility and risk minimization. This entailed using a common process that could be driven globally, but also a strong emphasis on development and people, recognizing that there are regional differences that have to be managed. [Global Pharmaceutical]

We have started to move to global logistics hubs to re-think how we deliver in the Americas and other regions, and moving into different kinds of segregation and hubs that are required to service different markets. A lot of this is cost and sustainability focused, especially around how we maximize transportation loads. We are also looking at cross-regional sourcing, and the final decisions in terms of the benefit on cost, but also what it means in terms of carbon footprints, and shipping products all over the world. The design of the logistics network is no longer taken in isolation in each region, as it was done in the past. [Global Consumer Goods]

On a global scale, I have every local plant manager, even in Complete Knockdown (CKD) countries, reporting dotted line to me, so that we can track key metrics and issues that are going on. But for the larger production footprints, we let each location manage local logistics and supply processes, and these are not in my span of control. [Global Automotive]

We seek to use dual reporting in our organization. For example, a procurement director reports to vice presidents in both manufacturing engineering and procurement. Although this can create conflicting goals and objectives, the mechanism also provides an excellent opportunity to balance their agendas, and act as a problem solver across two different areas. For instance, procurement doesn't just focus on cost, but must also consider engineering capabilities, product standards, and supplier capabilities. [Global Electronics]

Our interviews with Chinese executives also revealed that agile decision-making was problematic, as the chain of command is still highly centralized, and independent decision-making is a cultural attribute that is hard to overcome, given its roots in centralized planning. A senior government official in China described this issue succinctly:

In terms of organizational structure, the China supply team reports to both the head of China operations and Asia-Pacific supply chain director. There are both positive and negative sides of this kind of structure. First, with this approach, the company has very tight control of its supply chain operations and major mistakes are less likely to occur. However, the dual reporting system also generates communication issues. Also, the goals of the China operations and Asia-Pacific supply chain team are not always well aligned, and performance measurement is not consistent. [Industrial Chinese manufacturer]

Strategy PR2 – Integrated Planning and Cost Analytics Enables Effective Decisions

Many organizations recognize the need to develop a single planning function as they expand to move to a global supply chain planning system, in conjunction with the development of a team of global brand/ business planners. Teams are focused on collecting and compiling market forecasts, consensus forecasts and inventory management plans, production plans for designated facilities, and distribution models, and establish supply plans that will drive down inventory, improve customer service, and drive efficiencies. This is an entirely new role for many companies, as planning has in many cases in the past been conducted primarily on a regional and local network, with large finished goods inventory buffers to cover deviations. With the move to a global planning model, top companies are defining a structured process to build, update, and revise the plan for global supply and demand. There exist several challenges in accomplishing this objective. There is a need for a set of well-defined roles and responsibilities for regional market planners (as well as where these individuals are in the organization!) Some regions have a well-defined planning process, but others do not. To support this planning system, organizational enablement and development is required, especially through training focused on learning new roles and responsibilities for global planning. Global planning roles should emphasize common sharing and communication of market forecasts, development of exceptions, consensus building, capacity planning, supply scheduling, and execution of the plan. Along with the implementation of the integrated planning systems, development of an integrated sales and operations planning process with defined roles and responsibilities ensures that a structured approach is adopted by the global planning team to review the forecast, develop a production/distribution plan, identify exceptions, reach consensus on adjustments to the plan, allocate production to sites, and work with regional planners to manage packaging and distribution at the local site level. Previous research suggest that best-in-class integrated global planning processes are characterized by the following:[13]

- Leverages best practices in sales and operations planning in other leading manufacturers
- Defines key roles, responsibilities and processes for global planners
- Allows input into global budget planning and cost/revenue planning for strategic planning at corporate levels
- Allows enough flexibility for local market practices, but standardized global planning that will drive production plans at global locations
- Aligned with site selection methodologies and alliance selection processes, and scalable to include local country distribution strategies for future products in the pipeline
- Identifies technical constraints and production bottlenecks in current and future product profiles
- Processes designed concurrently to leverage customer order promising systems, aligned with templates and requirements of these systems

Another form of integrated planning involves cost analytics and allocation planning to establish appropriate pricing and delivery commitments to key customers in different regions. Such cost analytics will demonstrate tradeoffs in transportation, warehouse, and regional production requirements, as well as establish a baseline against which to judge further changes and planned network changes. Integrated cost analytics capabilities allow organizations to better make such network adaptation decisions.

I have every intention of having our production footprint 70% in the local market, but today we are realistically at 60% domestic production, 40% export. We allow transportation costs to fluctuate in the markets we serve to pick up demand. However, we run an internal 3PL/4PL to ensure that we are optimizing our supply chain, and we have our own trains that we invested in. [Global Chemical]

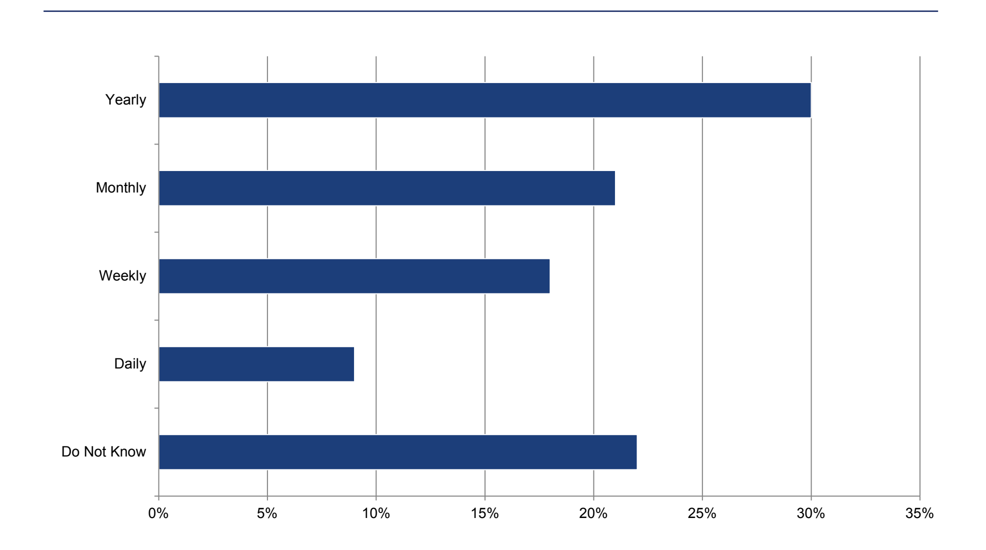
In the past, the supply chain spanned different functions. Manufacturing had governance over raw materials and work in process, marketing and sales governed finished goods, and procurement was a different function altogether. That caused difficulties with matching production planning and demand forecasting. Today we have a more integrated supply chain organization where manufacturing of raw materials, packaging and procurement is one integrated unit, which ties demand, production planning, inventory management, and creates clear accountability for the cost of goods. Product supply responsibility is now limited to raw materials inventory, and a service level agreement is made with marketing, who owns finished goods. This prevents marketing behavior such as not ordering enough to hit sales targets. Today, the supply chain has a supply agreement with marketing, and this allows us to sit at the table and establish clear rules and frameworks for supply of certain products. [Global Chemical]

As of now, the company is focusing on improving supply chain efficiency. Most notably, S&OP has become much more important. The company evaluates production capacity, demand, and plants constantly. Planning is a critical process, with the longest planning period being 18 months and the shortest being 1 month. Based on joint planning meetings, the company adjusts its production, inventory, and sales planning constantly. The result has been very positive [Chinese Tier 1 Automotive]

Strategy PR3 – Network Adaptation, Working Capital Time Frames and Logistics Network Design

Some organizations are re-thinking their global expansion footprint, and are bringing some sourcing to local regions ("nearshoring"). For instance, some European companies are moving manufacturing to Eastern Europe from China and Vietnam, while North American companies are moving from Asia to Mexican and South American sources, as our data reveal. While the outsourcing of manufacturing to low cost countries was a major trend five years ago, we are now witnessing more organizations questioning the wisdom of these decisions, especially in light of the increased complexity being seen, combined with a new view on total cost of ownership. The uncertainty in the face of increased requirements for reliable and resilient supply chains is causing some people to re-think global low cost country sourcing.

One reason for this is executives' recognition that the need for localized, effective decision-making is more important than ever. The timeframe for logistics network design has also changed rapidly. More customers are protecting working capital, and this is effectively forcing more capital investment down the supply chain onto suppliers. Some of this is driven by the tough economy which has made companies more conservative financially, and that is expected to continue for some time into the future, which is why margins are growing more slowly in the global economy. In the past, a capital decision could have a longer-term horizon, but more organizations are pushing for shorter-term planning horizons. As shown in Figure 24, the majority of organizations re-plan their logistics networks on an annual basis, but an increasing number are doing so on a monthly, weekly, or even daily basis, based on changing requirements, logistics infrastructure, barriers at ports, or disruptions in logistics channels. That is to say, more frequent re-planning involves major shifts in capacity allocation, production and transportation scheduling, and inventory allocation. In general, the frequency of this re-planning is increasing compared to the past.



24 | Percentage of Logistics Network Re-Planning Frequency Used

This is reflected in several of the comments made by executives in interviews.

All capital investments now need an 18 month payback, and have to be more flexible because things change so quickly. You used to be able to design a logistics network for a 5 year planning horizon… now you need to do it for only 12 months. Fuel costs, labor rates, tsunamis, route to markets – all of these things will change and make it essential to have absolute flexibility, So we are constantly reviewing our operations in China, Europe, and North America to assess consolidation, deconstruction, repack, delivery, and other factors to ensure that we have a strong and resilient pipeline between regions. [Global Electronics]

In automotive, assembly plants want less inventory, and have established warehouses nearby and have shifted the burden on the supplier. Local warehouses sequence to assembly plants, and incentives are created for the supplier to control inventory. Companies are pushing for higher internal rates of return on capital, and are forcing more return on capital by pushing it onto the supply base. Suppliers are taking on more capital investment roles, and that is likely to continue for a number of years. This is also forcing us to rethink our technology roadmaps, and align them with the product line and delivery methods in logistics, so that we can match the delivery expectation. [Tier 1 Automotive]

To cope with local government requirements for localization, we have had to move to Semi-Knockdown (SKD) and Complete-Knockdown (CKD) operations in countries that we never would have done 2-3 years ago. We were convinced years ago that the WTO would sort that out for us, and that we don't need localized production processes. Life has taught us a different lesson – and to proceed with sales in Argentina, India, or Russia, we needed to cope with regulations that required us to establish an auto industry in their country, and force international OEMs to setting in their country to perform value-added steps. We calculated the business case, and found the market was promising enough to finance that. But we would not have come up with that idea on our own if the requirements were not there!
[Global Automotive]

Setting up a new supply chain network every year is too short a timeframe. You need time to implement and harvest the change. But I agree it is taking place more frequently than in the past. It is more of an issue for technology supply chains than chemicals, where we adjust the network about every five years versus every ten years in the past. A cracker facility is a $1.5B investment, so we have to hunker down for at least five years after we build it. But the volatility and ambiguity are big issues and we deal with those as much as in a retail environment. So we have to set up our supply chains to be resilient enough to withstand major disruptions.
[Global Chemical]

China's healthcare market is going to grow for the general population, and China has never been a country where it is easy to import. That will change as a domestic market in China will eventually emerge. Quite a few Western companies have acquired Chinese companies to get access to distribution networks. What we see is that it is becoming becoming more expensive and there are no more bargains out there anymore. If you look at the rise of basic healthcare availability – the move from community practice is going to happen – and there is an interesting dynamic that is difficult to predict. [Global Pharmaceutical]

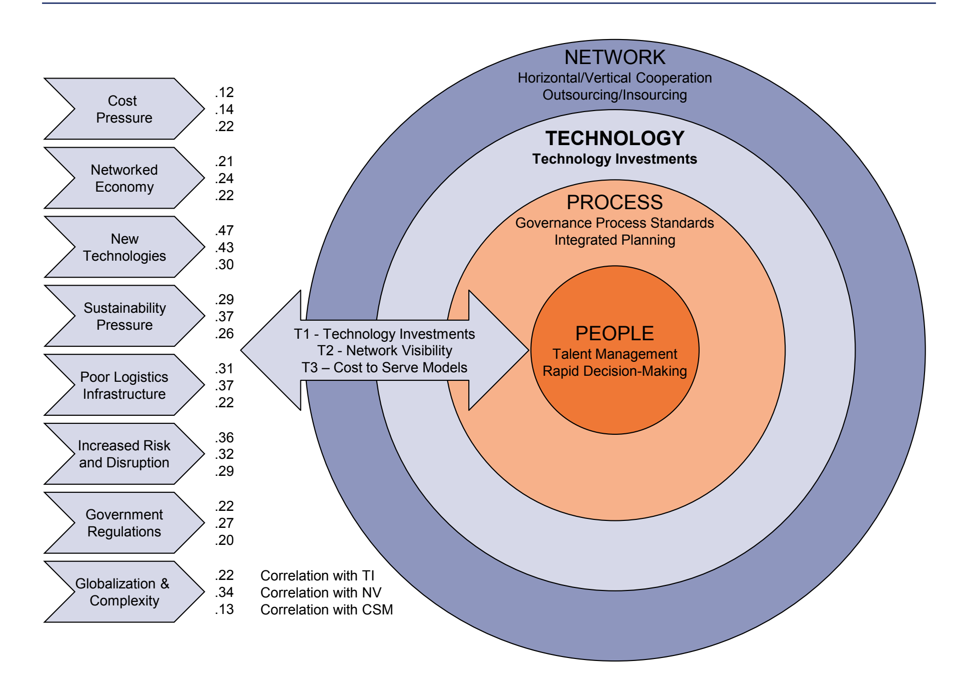
The connection to the sales and marketing team requires constant changes in our logistics network. You are only as good as the information flow, and criticality of information flow will grow. You have difficult situations where the distribution network is changing, and the end company network is changing, as well as a changing dynamic around the patient base, all at once. Pharmaceutical companies are expanding their bulk production in emerging markets, which results in a changing shift of geographies, distribution networks, and reimbursement, pricing, and governments. The whole thing is incredibly dynamic at the moment. That just means that you have to get information flows working really well, and configure/re-configure supply chains. To do that we invest a lot in a communications infrastructure and software between ourselves and the customer to make those flows work better.
[Global Pharmaceutical]

Companies are starting to "near-shore" again, because of the simplicity of doing business in Europe. China is too much of an unknown to deal with, and the rapidly rising cost in China is reducing the cost advantage to such an extent that logistics costs are outweighing the benefits. And as retailers put sustainability metrics on every item showing the carbon footprint, that may also play a role. This has raised debates, for instance, on whether the carbon footprint of a rose grown in the Netherlands in a greenhouse exceeds the carbon footprint of a rose grown in Kenya and flown in!
[Government Airport, Netherlands]

We are seeking to harmonize our product lines across North America, Latin America, Europe, and Asia-Pacific. This impacts the number of SKUs we have and has a very beneficial impact on working capital. Of course marketing wants one package for each customer, but we are resisting that and seeking to create solutions that are globally applicable, and putting more restrictions on product SKU growth. This is a gatekeeping process, and there are financial thresholds around it.
[Global Manufacturer]

Technology

Organizations are continuing to use technology as a great enabler, recognizing that any technology advantage is short-lived in today's competitive landscape. However, top performers are finding ways to exploit technology to drive quicker decision-making, by providing information to individuals who are empowered to make decisions based on this information. Therein lies the true magic of how technology is being used by top performers: as a means to drive future "what-if" planning, scenario development, and a capability to "act before others do." Technology is also enabling "near shoring" due to emerging applications (communication and information) and hardware (such as highly flexible robotics) that render economies of scale less important than in the past. These developments may re-shape the future of global logistics networks predicated on the requirements to offshore to low cost countries to remain competitive. Organizations who are aware of this have mapped their technology investments to focus on key data requirements, and have aligned these investments to current global logistics network growth strategies (Figure 25). These organizations understand that there will be many logistical challenges ahead. Our research data support that enterprises with well-developed technology strategies are investing in order to cope with almost all of the major trends on the horizon, but most importantly, cost pressure, new mobile and "big data" technologies, sustainability, the lack of infrastructure in BRIC countries, an increased risk of disruption, government regulations, poor infrastructure, and increasing global demand complexity. The comments and insights below provide clues as to how your organization needs to think about these developments.



25 | TECHNOLOGY: Empowers People with Information to Make Better Decisions in a Complex Global Environment

Strategy T1 – Aligned Technology Investments

As organizations struggle to manage global complexity, logistics executives are making a business case for investment in technology solutions to help manage this complexity. Specifically, they are identifying the benefits associated with global supply chain material flows transparency and visibility, which is justified not only in inventory savings and transportation cost savings, but in increased customer service, increased market share, and higher profitability. Such solutions have several characteristics in common when it comes to desired requirements:

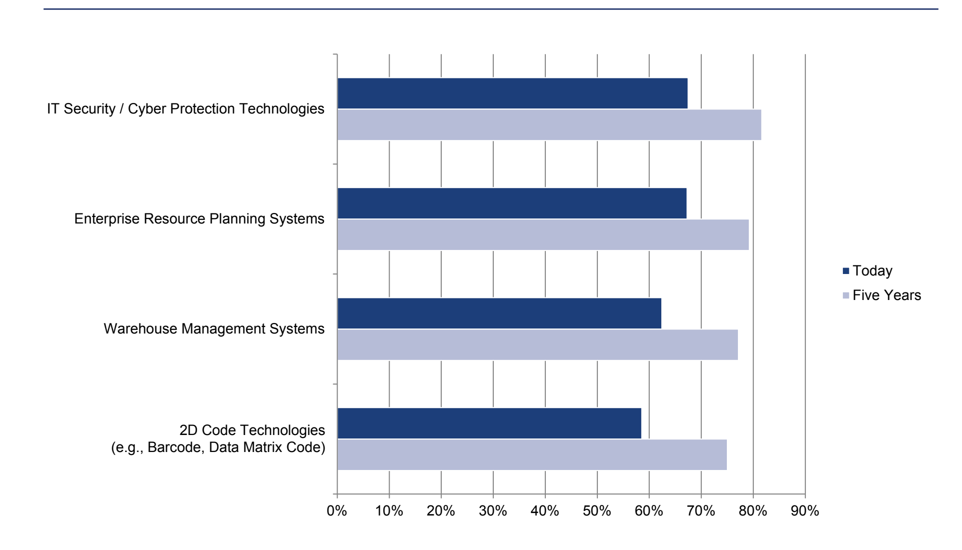
- Ability to integrate multiple legacy systems in different divisions
- Access mobile technology allowing people to have their "supply chain on their smart phone"
- Provide simulation capabilities for network "what-if" scenario analysis and risk contingency planning
- Ability to capture total cost solutions built on best available knowledge
- Single integrative point for KPI collection using multiple databases as input to create "data-mash-ups" and synthesized consolidation of information from multiple points in the globe
- Provides alerts based on critical market intelligence
- Supports rapid decision-making through frequency and timeliness of data refreshes

Organizations are targeting technology investments in the next five years that align with the need to deliver these customer and performance benefits. Organizations in our sample dedicated an average of 11% of their logistics budget to technology investments, although some were investing as much as 50%. Carriers and 3PLs are also beginning to turn to collaborative

technology to eliminate blind spots that exist today in the movement, delivery and return of containers to and from the last mile – the final customer destination. In a report published by the Aberdeen Group[14], a survey of 58 intermodal freight users analyzed how challenges faced by intermodal users differed from their single-mode counterparts, how they were coping with current global intermodal requirements, and what technology strategies were being adopted in response. Compared to the others, intermodal users – companies moving containers to and from ocean ports and rail ramps, mainly as part of international shipments – face more complex requirements. These include not only coordinating equipment and container movements from port, rail, truck and inland customer delivery locations, but also the tracking and return of the containers to the port designated by the container owner.

Intermodal users are three times more likely to have automated the exchange of information, 3 times more likely to scorecard transportation activities twice as likely to have visibility tools to support backhauling against empty miles, according to the report. Yet, "although they can be characterized as 'early adopters' of automated data exchange compared with single mode users, still only 57 percent of the intermodal users in the study had visibility and optimization tools in place to manage last mile execution".[15]

Technology solutions are providing multiple benefits that address many of the challenges identified in the first part of this study. These solutions are mapped to specific types of technologies that deliver different benefits in the section that follows. We identified a number of specific technology strategies in the research that are mapped to different potential outcomes. In this report, we have concentrated mainly on IT-related technologies, as they were emphasized as particularly important in our interviews.



26 | Percentage of Core Technologies Invested In

Core Technologies are the most prevalent technologies as they form a solid foundation for emerging technologies, and include such elements as IT cyber security technology, enterprise resource planning systems, warehouse management systems, and 2D (barcode) scanning systems. Almost 80% of respondents have on-going investments in these technologies in the next five years (see Figure 26). These technologies provide an enabling foundation for global material and delivery visibility and business intelligence that ensures data capture occurs correctly the first time and is accessible by all individuals. Such systems allow quicker response to global complexity, enable effective integrated planning and a solid basis of KPIs and reliable data upon which to build business analytics. To enable these technologies, organizations must have a defined technology roadmap for system integration. A solid core technology foundation enables future alignment of strategic investments in emerging technologies that can build on the core in order to enable customer-configured solutions and influence technology development efforts with partners to provide better outcomes that come to market more quickly.

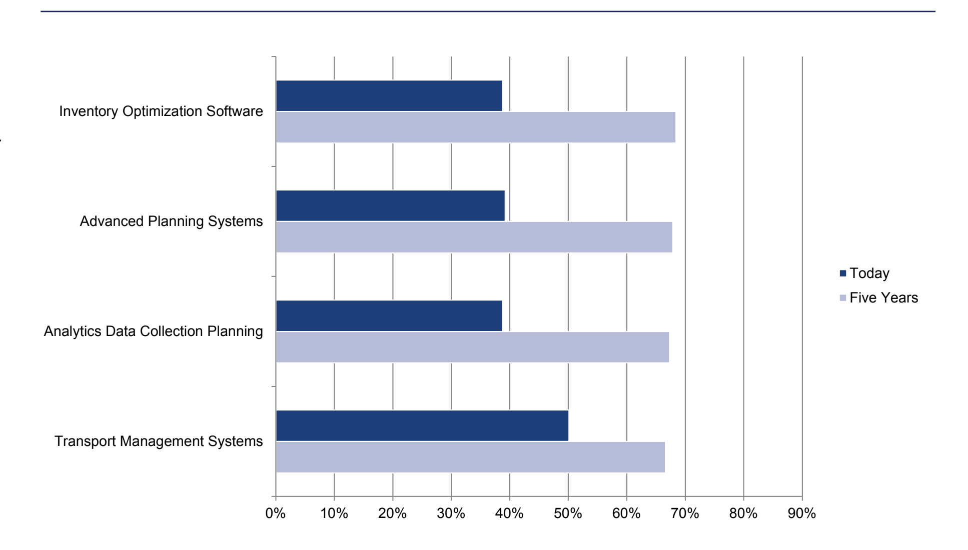
An example of a respondent discussing this trend is indicated below.

We made a massive investment to standardize our IT platform infrastructure. We moved to three regional platforms in Europe, Asia, and America, and had moved everyone to the same IT platform and processes. This entailed a massive data harmonization effort to code all materials, vendors, articles and customers across the three platforms using a unique codification system. This was one of the most important factors that allowed us to manage a global supply chain. We are not as advanced in barcoding and RFID, but I believe a strong foundation is most important. [Global Chemical]

Strategy T2 – Network Visibility

As organizations recognize that to empower people they must provide them with real-time visibility to events, customer requirements, capacity information, and others forms of data, they are investing in multiple types of technologies that not only collect and disseminate current data, but provide accompanying network modeling tools that allow users to project "what might happen" given the information available on the current state of the network. We found that this strategy is particularly important for FMCG companies.

Network optimization technologies (Figure 27) provide a means for organizations to collaborate with others in their supply chain, share information, and create scenario analysis to better model decisions. Such technologies focus on network replanning algorithms based on updated event notifications collected from multiple parties in the supply chain. Over two-thirds of respondents plan investments in these areas in the next five years. Many of these technologies are enabling superior tactical responses through real-time visibility and an ability to trigger potential disruption event notices. These are providing real improvements in the form of responses to many of the trends identified, including:



27 | Percentage of Network Optimization Technologies Invested In

Examples from customer discussions include the following:

In India customers are increasingly seeking to leverage technology to overcome infrastructural challenges. Examples include vehicles GPS tracking, vehicle security (like secure locking systems that send out an alarm when the door is opened) and application of IT in documentation applications (replacing paper). We also are able to export shipping documents out of customers' ERP systems and all the data taken out of the tracking system is processed so that a lot of information can be provided to the customers. We are able to link it to the GPS data from vehicles to track total lead times, waiting and loading times at the suppliers, driving times and delays, all in the form of customer reports. Like this we can also identify troublesome roads and/or roads with high traffic. In this context we are also developing and using optimization models and leveraging IT systems to provide large amounts of information about supply chain performance to our customers. [Indian Logistics Service Provider]

Four years ago we rolled out a brand new transportation management system with an integrated labor management tool to give us uniformity and visibility of systems and processes in our distribution network. It has a lot of scalability, flexibility, and adaptability for the things we have to do. Integrated within that is a robust routing tool that allows us to do a lot of route modeling and optimization to be as efficient as possible, to be able to have defined delivery times to our stores based on where they are, times of the day, etc. There are local government ordinances and these are all integrated into our routing packaging. All trucks have on-board computers and we can monitor tractor or driver behavior, idle time and other issues to be as efficient as possible for fuel usage. We also use a lot of web-based scheduling tools and visibility tools, a very robust transportation in-bound and corporate outbound transportation tool. And we put in a lot of technology on modeling tools, to constantly model our network to be most optimal as it relates to inventory being in the right facilities. We do a lot of proactive planning as it relates to that future state view to be ahead of the curve, including enhanced forecasting and replenishment tools to drive best-in-class stock efficiency. [US Retailer]

- Increasing information sharing with key partners allows improved network adaptation and quicker optimization of networks as big data combined with internal business intelligence produces better solutions.
- Improved routing technology and GPS capabilities allow organizations to quickly adapt to uncertain logistics conditions, and react to traffic bottlenecks, road construction, port delays, and other infrastructure issues.
- Improved access to supplier Advance Ship Notices (ASNs), global weather patterns, demand patterns, and inventory visibility allows improved risk management, scenario planning, and disruption mitigation planning.

An important strategic initiative for companies is to start considering how to create reliable, accurate, and timely data collection processes that will begin to form the foundation for the relational databases upon which analytic models will depend. These data elements also form the basis for advanced planning systems and transport management systems, both applications deemed important in the next five years by over two-thirds of respondents (Figure 27).

Strategy T3 – Cost to Serve Analytics

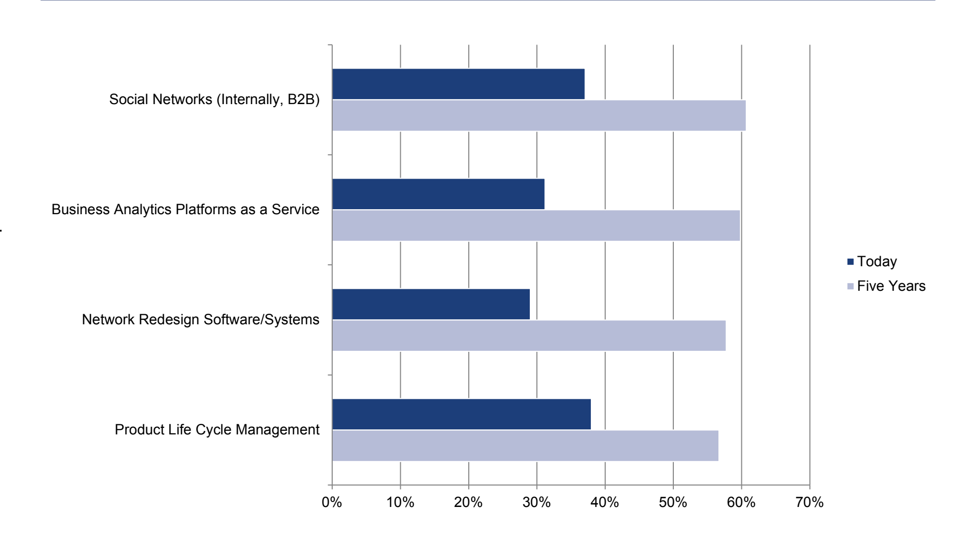
The rise of Business Analytics and Big Data applications is increasing in the next five years, with almost two-thirds of companies investing in these capabilities. One of the most important applications of so called "Big Data" is the ability to create customer cost-to-serve analytics, that better capture total cost, landed cost, and customer profitability, that better allow logistics organizations to make decisions that not just reduce cost, but optimize profitability and market share growth. In their pursuit of logistics cost-to-serve analytics, respondents emphasized how this is a new and emerging area, where the early pioneers will learn much along the way that will help them forge ahead based on organizational learning. Those who play a "wait and see" may find that they will be in a continual catch-up mode in terms of this learning.

Organizations are experimenting with social media, and learning how to exploit the capabilities of real-time feedback from consumers, and converting this into competitive and tactical advantage. Data integration and big data is another key area impacting logistics. Gartner has identified the rise of business analytics platforms as a service (PAAS) as an important trend in the next five years, and our respondents are also exploring such solutions that provide analytics capabilities in the cloud. The sheer amount and spread of data that organizations are expected to capture, interpret, hold, and represent and make available to customers is proving to be daunting. The cloud, the Internet, machine-to-machine communication, and other emerging technologies will determine how people consume products and services, and by definition, represents an opportunity to better understand the customer's needs, and to better plan and optimize logistics assets. This progression is shown in Figure 28.

The advent of "big data" is clearly an opportunity that early movers will be able to exploit. As organizations seek new ways to mine the wealth of data that resides on the internet, on massive transaction databases, in the mobile devices of consumers and logistics providers, and in automated warehouse systems, the opportunity for improved planning and agile logistics becomes truly possible.

An increasing number of companies are deriving very specific big data analytic solutions that are designed to address many of the challenges discussed in the Trends section of this report.

- Improved access to cost-to-serve models are able to deliver targeted solutions that optimize transportation and logistics costs, but also product design and assembly costs as organization deal with increasing cost pressure.



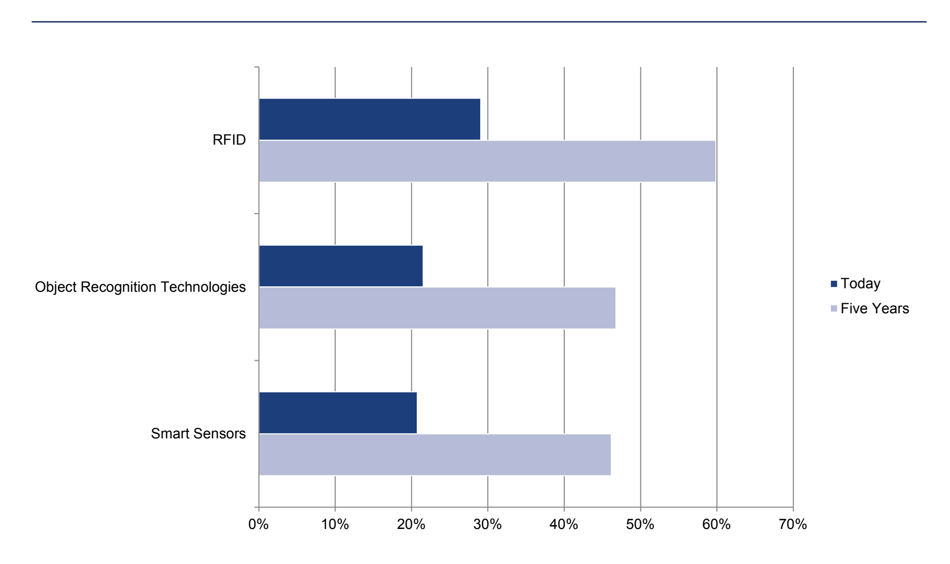
28 | Percentage of Analytics and Big Data Technologies Invested In

- Improved life cycle analysis technology and transportation optimization solutions help drive more sustainable solutions, lower carbon footprint, and improved visibility into global labor and human rights conditions.

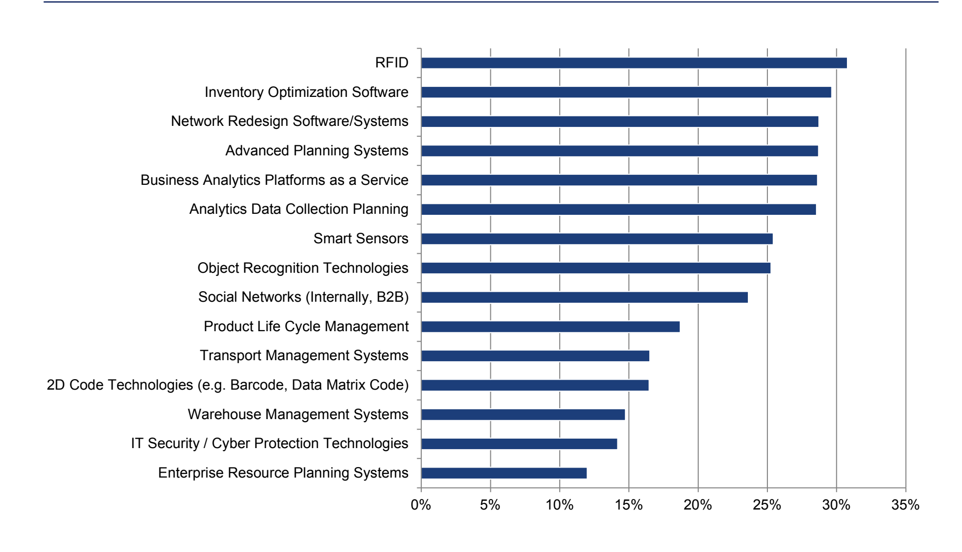
- Global compliance and trade databases, and improved collaboration with freight forwarders and LSPs enables improved response to changing government regulations, import/export issues, and cost analytics capabilities associated with tariffs and fees.

- Global material and delivery visibility allows quicker response to global complexity and planning responses

To align with the ability to collect data, organizations are investing to some extent in hardware solutions that enable better data collection and tracking of information. However, the jury is still out on whether technologies such as RFID, object recognition, and smart sensor technologies can be effectively integrated into existing operations, with about 50% of the respondents believing these will play a role in the next five years (Figure 29). Nevertheless, RFID is projected to have the single biggest growth based on respondent feedback (Figure 30), followed by inventory optimization.



29 | Percentage of Hardware Solutions Invested In



30 | Growth in New Technology

Top Performers Do Not Invest More in Advanced Technologies

It cannot generally be stated that top performers are investing more in highly advanced technologies (e.g. smart sensors, business analytics platforms or inventory optimization software) than other companies. Conversely, top performers are investing more heavily in ERP and 2D technologies as foundational sources of advantage for the coming five years. Indications are that they are investing in technologies that can build core logistics data architectures and functionality rather than for enabling added value. Thus, these organizations recognize that ERP, although not a differentiator in the market, provides a solid foundation for building logistics capability. Likewise, a 2D technology strategy begins to build the foundation for a "Big Data" strategy in the years ahead, as the means for data collection in the field becomes a core capability upon which to build an analytics logistics strategy.

Most organizations are in the early stages of exploring how to mine "big data", and some of the individuals we spoke with alluded to this.

We have two billion garments moving in our supply chain in a year, with products in 9 countries with 27 internal facilities, as well as with dedicated cut and sew contractors. We have over 100,000 SKUs in our portfolio, and struggle with inventory targets, network optimization, and distribution network design. We are seeing the need to internalize our application and knowledge of cost modeling, simulation for network design, and integration of our many ERP systems. We have wired our 3PLs into thinking about continued standardization and discipline at our ship points – and we are demanding that they continually update attributes at these points to reflect new demand. We are forcing them to update the data and measuring them against that to see if they have done it. In some cases, it is manual, but it is getting done. But we believe that the real opportunity is if we get our major [RETAIL] customers more visibility into shelf-space availability in the store, we could see another 1-3% increase in revenue – equivalent to launching a new brand. As the Chief Supply Chain Officer, my ultimate vision is to have my supply chain on my iPhone! Why can't I have that! [Global Apparel Manufacturer]

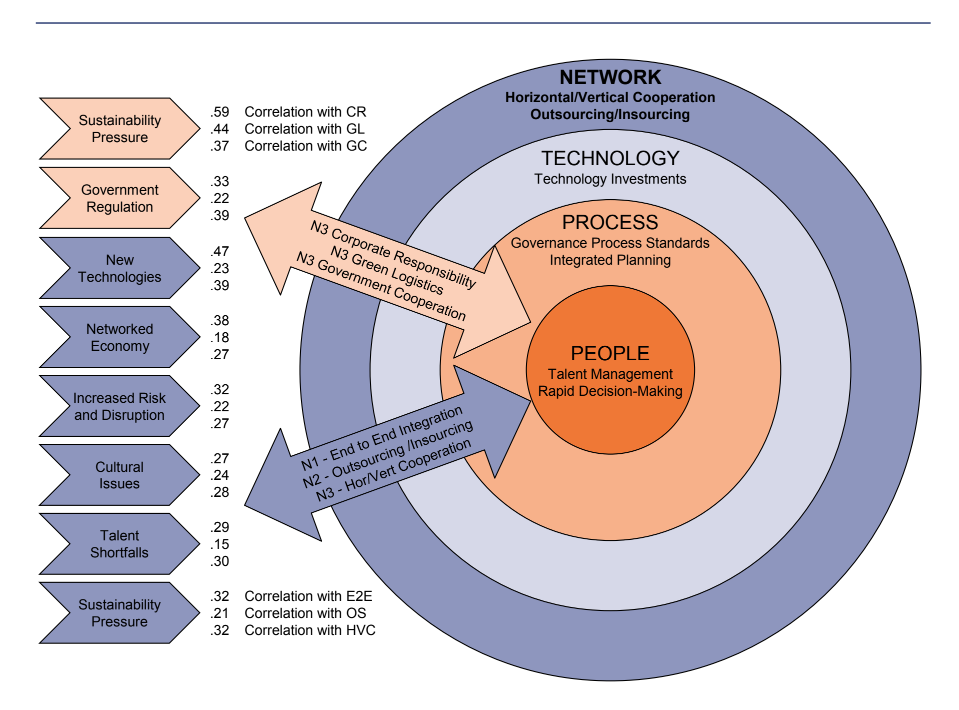
Big data is a big issue for us. The sheer amount and spread of data that you and I are expected to capture, interpret, hold and represent and make available to customers is a major impact on most organizations, and certainly on us. The cloud, Internet, machine-to-machine, and other elements will impact how we do things. At some point in the future, the customer will be able to reach back into the supply chain and divert orders, or even change their product orders, but we are not there yet. But soon customers will be involved in the whole end-to-end supply chain. [Global Electronic]

Network

C-suite executives are increasingly tuned in to the reality that to meet shareholder expectations, they will need to operate in an ecosystem where their organization is part of an extended network. Operating in a network requires that individuals think of not just their own enterprise's interest, but also of the health and welfare of the other entities in this network. This recognition is based on the simple fact that to compete, the supply chain is the effective unit of analysis, not the individual enterprise. This thesis results in a very different set of organizational behaviors, strategies, and investments, and the enterprises that are best able to operate their networks as a cohesive unit will be left standing in the competitive and evolutionary lifecycle of the modern global economy.

- Organizations are seeking to create mechanisms and tools to facilitate end-to-end integration of processes, planning, strategies, and information flows across business functions (customer selection, demand planning, supply planning, order fulfillment, production scheduling, materials management, and supply management). Many are beginning to extend this integration into their network of partners in the supply chain ecosystem.

An example for this observation is the move towards backward integration in the retail sector.



31 | NETWORK: End to End Integration, Network Adaptation and Community-based Efforts Enable Aligned Responses to Global Complexity

- Executive teams are re-evaluating outsourcing decisions, as well as low cost country sourcing decisions, and considering the benefits in terms of cost, flexibility, resiliency, dependency, and innovation accessibility. A much more sophisticated insourcing-outsourcing decision process is being applied by leading organizations, as this is considered a strategic capability investment decision, no longer a simple cost savings exercise. Organizations are establishing detailed plans associated with rolling out outsourcing plans that consider capability development and mitigation of any impact to customer service.
- Top performing companies are reviewing their long-term relationships with organizations in their own industry (horizontal network) as well as their upstream and downstream networks (vertical network). Specifically, they are considering the impact of their strategies on other key entities in their ecosystem, most notably, the human community, the environment and the local government agencies. By cooperating with other organizations in their ecosystem, their logistics strategies have a higher probability of a successful outcome. Moreover, vertical relationships will also help to facilitate end-to-end integration.

As shown in Figure 31, the network strategies described here have a major impact on several of the trends identified in the study. First, organizations that adopt a network culture are better able to absorb new emerging technologies, and are better able to adapt to the challenge posed by different global cultures. They are better prepared to deal with talent short-falls, as well as increased disruption risks, and they are more aligned with a networked economy. In addition, organizations that develop strong community-based responses in the form of stronger corporate responsibility efforts, improved green logistics measures, and stronger ties to government have improved responsiveness to the trends of sustainability pressure and government regulation.

These strategies are described next in more detail.

Strategy N1 – End-to-End Supply Chain Integration

Organizations are seeking to drive increased integration across not only processes such as customer service, distribution, transportation, warehousing, inventory management, and order fulfillment, but are extending this integration further back into manufacturing production scheduling, and even to supplier planning. As the full impact of product and system design issues on the end-to-end supply chain becomes apparent, there have been major initiatives to try and drive total cost analytics, market intelligence, and performance analytics into these processes to drive improved decision-making. Such efforts are nascent in most organizations, even though the need for improved insights for decision-making is clear. Change management is a continuous barrier to deployment of end-to-end integration.

It is also important to note that sharing information is not a novel strategy in logistics. Organizations have been sharing production data through EDI and other means for the last thirty years. What differentiates this sharing today, however, is the level of integration, diversity of information, depth of information, intensity of exchange, and number of applications spanned in network integration.

Building a true end-to-end integration platform is a major initiative, and in some cases, this capability is an end-point of several years' worth of effort. Leading organizations recognize that volatility in the market is a fact of life requiring end-to-end supply network synchronization that moves well beyond the well-known approach of "produce to demand" that has been around for many years. In many supply chains, the volatility of demand around weekly shipment qualities has moved from 50% to in some cases more than 120% of demand, where the actual standard deviation is larger than the demand mean! At a daily level, the variation is even greater, amplified by a factor of two or three. Even with this level of volatility, some organizations are thriving and able to improve responsiveness, improve their service level index, and reduce inventory. The main drivers for this activity involve three major efforts: 1) redesigning for responsiveness, 2) collaboration with key customers and suppliers, and 3) synchronization of the process with demand.

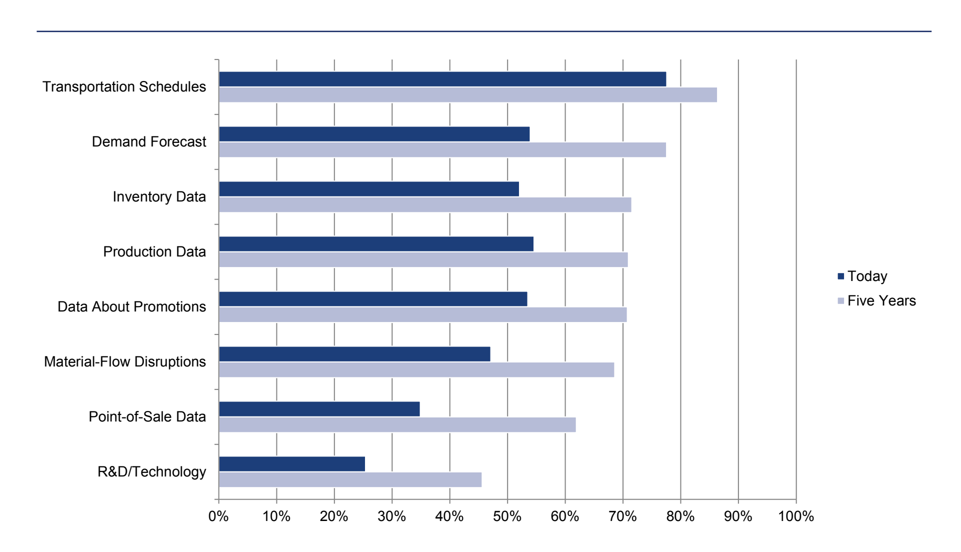
The first major initiative is to redesign planning systems to ensure responsiveness to demand signals that are occurring and transmitted in real-time. There are often many excuses why production signals aren't being used, but even in such cases, short-term forecasts can be used as a proxy for production demand. Database collaboration tools are an important component of real-time demand planning, which involves ensuring that all entities in the network are sharing systems and have access to the same information. This promotes improved planning and responsiveness. As shown in Figure 32 the majority of respondents indicate that they are either today or will be in five years sharing multiple forms of information with network partners, including transportation data, demand forecasts, inventory data, and production data. Fewer, however, are intending to share more proprietary forms of data, such as POS and technology information. However, leading companies recognize that POS data is critical, since an increasingly higher percent of volume is manipulated for promotions. In some retail supply chains, order visibility is as low as 3 days, and promoting sharing of this information can enhance re-

sponsiveness across the supply chain, and take out weeks of supply chain leadtime.

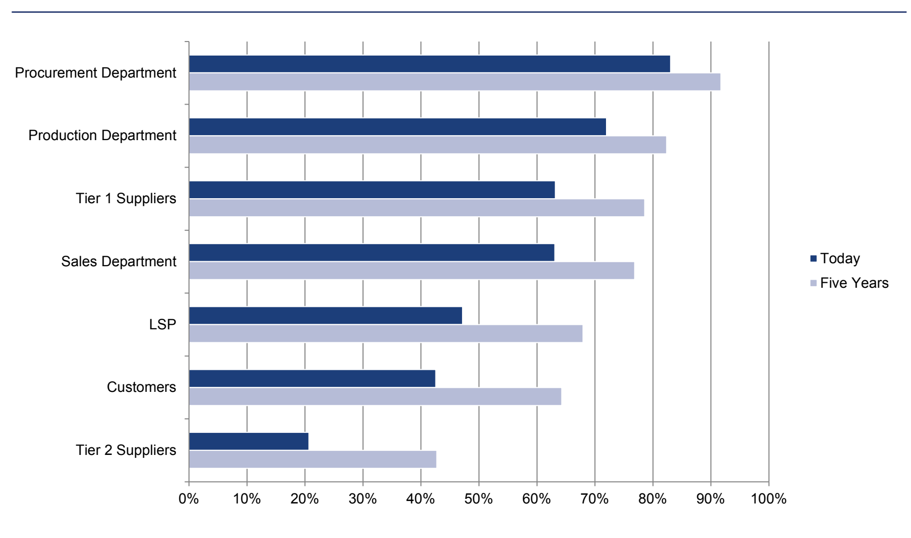
Two dimensions of information sharing stand out when it comes to top performers in our survey. First is the type of information shared. As shown in Figure 32, many organizations share tactical performance information related to daily transportation, demand, inventory status, and production status. Some even will share promotion data, and certainly material flow disruptions. Although R&D and technology data is not shared as often (due to intellectual property concerns), our research found that top performers are more likely to want to share R&D data, as they rely on trusted network partners to work with.

An important element of end-to-end integration is addressing the lack of supply network visibility through improved demand sensing. In many supply networks, POS visibility is one day, order visibility is one week, but an element known as demand sensing provides a one-month window to larger volatility shifts, enabling improved responsiveness. The key element here is that order shipment is triggered by demand sensing information, not by demand planning. Demand planning (the original forecast) is used as the input to check against actual shipments and open orders, which results in a demand sensing figure. An algorithm can drive different demand horizon data, which then drives behavior in the extended supply chain. Organizations who have used demand sensing have had remarkable results, with forecast errors reduced from 60% to 30%.

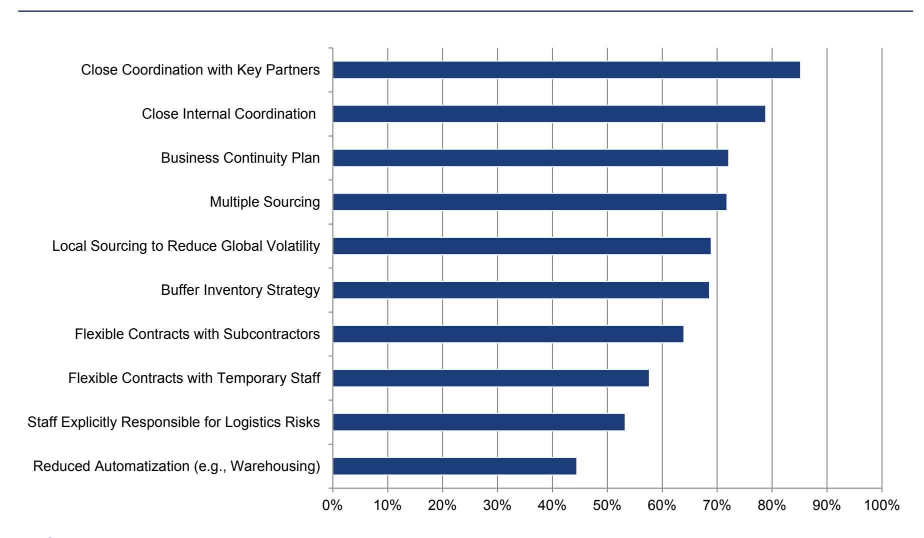
A second dimension of information sharing is the arc of integration, meaning the number of different network partners who are included in data sharing. As shown in Figure 33, almost all organizations share replenishment information between logistics, procurement, production, and tier 1 suppliers. Another group share information with their internal sales and external LSPs. However, only a relatively small number share replenishment planning informa-



32 | Types of Data Shared with Network Partners (% Respondents)



33 | Network Partners We Share Information With (% Respondents)



34 | Percentage of Risk Mitigation Strategies Pursued

tion with major end customers and Tier 2 suppliers, extending the arc of integration beyond the first tier.

An important insight is derived from the graph shown in Figure 34. To manage the increasing risk of material disruptions, a large majority of organizations are deploying increased end-to-end integration in the form of closer coordination both internally and with key network partners. Although this is not a new development, it is also clear that network designers are also building redundancies into their supply chains, in the form of multiple sourcing agreements, buffer inventory and increased use of local sourcing to improve responsiveness to disruptions. Interestingly, all these strategies turn out to be applied more regularly in the electronics industry than in many other industries.

Top Performers Share More Information with More Partners

What differentiates top performers is that they are much more likely to share R&D and proprietary data than other companies. That is, information on promotions is much more likely to be shared with other parties in the supply chain, even though many organizations are loath to share this information. For example, some manufacturers have exclaimed that the only time they hear about their customers' promotions is when they read about it on a website or in a print advertisement!
The arc of integration is also a distinguishing feature of top performers. Top performers are more likely to share replenishment planning information not only with their Tier 1 suppliers and LSPs, but also with Tier 2 suppliers. This level of sharing provides improved responsiveness and ability to manage different elements of the global supply chain.

Several direct quotes from the interviews reveal the diversity of different types of network sharing and information sharing that exists as organizations seek to build true end-to-end strategies.

European port operators are currently working on a hinterland strategy to integrate ocean freight with other modes. In Europe there are a lot of mono-modalities – boxes are trucked from A to B and on top of that – intermodal – movements by barge on the Rhine and last mile by truck. What is needed are not just modalities – but systems to cope with the diversion of logistics. A new way of thinking involves synchro-modality, a capability that enables companies to switch from a modality on an hourly basis whenever needed. Government agencies will play a key role in helping to deliver that capability to the market. At some point we might see shippers and forwarders giving customers greater access to their systems. The logistics system then becomes one that doesn't pull containers, but pushes them into the market. If you have bill of ladings and know where a container has to go, as well as knowing the final date and time, you could organize it differently than we do today. Ocean port operators could collaborate with forwarders, barges, truckers, and shippers to run synchro-modality pilots [Port of Rotterdam]

Companies are now also truly looking at end-to-end strategies, although they have largely paid it lip service in the past. With the need for increased productivity and increased flexibility, it has become a more important approach to drive solutions that are end-to-end. As one manager noted, "you are expected to expand what you do, do it better, – but also reduce your cost – which is complicated." In this sense, reliability is one of the key issues that is on the forefront of discussion in this area. There are also very interesting new developments in the area of collaboration, particularly with the growth of logistics clusters in key areas. Transportation collaboration has become a critical area of interest, with competitors even looking at collaborating on transportation resources, particularly for international logistics.
[Airport, Netherlands]

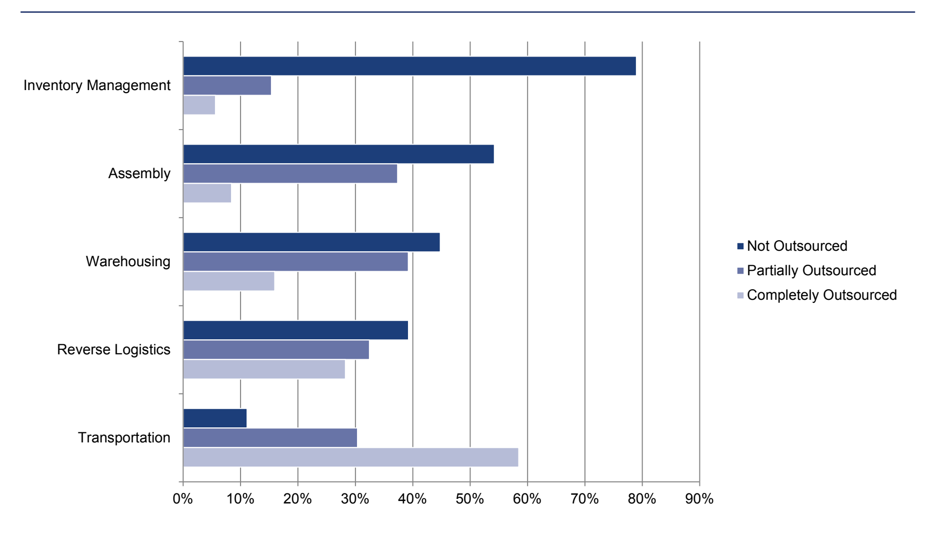
Strategy N2 – Outsourcing Strategy

Outsourcing has clearly been an approach used by organizations for many years. As complexity increases, however, some organizations are re-thinking their global expansion footprint, and are bringing some sourcing to local regions ("near-shoring"). Whilst the outsourcing of manufacturing to low cost countries was a major trend five years ago, we are now witnessing more organizations questioning the wisdom of these decisions, especially in light of the increased complexity being seen, combined with increased logistics costs due to rising fuel, and the uncertainty in the face of increased requirements for reliable and resilient supply chains. So for instance, some European companies are moving manufacturing to Eastern Europe from China and Vietnam, while North American companies are moving from Asia to Mexican and South American sources. Our data reveal that outsourcing/insourcing decisions are particularly crucial in the automotive industry.

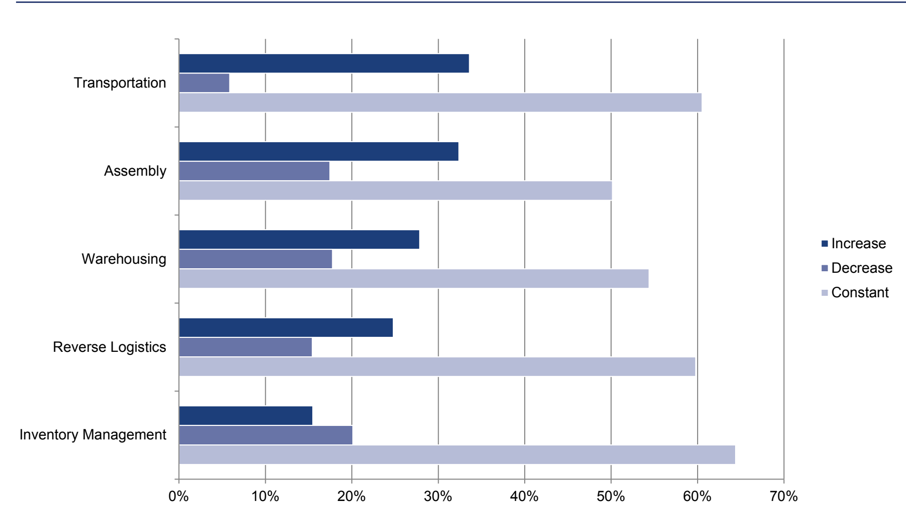
As the network grows, organizations are also recognizing that outsourcing parts of their network that are non-core to their business is critical. The graph in Figure 35 suggests that organizations are targeting certain processes for outsourcing. Currently, organizations are seeking for the most part to retain control of inventory management and production assembly, and a majority of enterprises are moving towards increased complete outsourcing of transportation. Reverse logistics and warehousing show a split on how organization view these capabilities and how much control should be retained. This suggests a move more toward greater control and integration of the end-to-end supply chain. For reverse logistics, there is currently a balanced approach towards managing this.

As shown in Figure 36, the trend to outsource transportation is likely to increase in the next five years, a good sign for LSPs. Many organizations recognize that point-to-point transportation is not a key, and many are seeking to build strong relationships with providers who have knowledge and/or an expertise in countries where the customer has no prior experience. There may yet be some room for growth of outsourcing in transportation, warehouse management and assembly operations yet to come (in 30% of firms in our sample). Interestingly, in our survey, almost all managers from LSPs believe that their customers are fully satisfied, but we found that quite a large proportion of managers, especially from manufacturing firms, are not. LSPs need to find ways to become more of a preferred partner, by better understanding their customers' view of their performance. This gap was less substantial in the United States.

Part of this may be due to the fact that organizations have reached the limits of outsourcing cost benefits. Outsourcing is being done for strategic reasons related to growth into new markets, but not as much simply for cost savings. In fact, organizations are beginning to "near shore". For instance, a major US industrial manufactur-



35 | Percentage of Respondents Outsourcing Different Processes Today



36 | Percentage of Respondents Outsourcing Different Processes in Five Years

er has moved more of their production to Mexico from Japan, in order to have quicker response times and lower transportation costs for customers. Even in electronics, Apple has pledged to move more of its production to the US from China, and has dedicated $100M in doing so.[16]

Top Performers Increasingly Make Outsourcing Decisions Based on Cost-to-Serve Analysis

One of the important strategies identified earlier was the intensity of organizational application of cost-to-serve modeling capabilities. Our results suggest that top performers are more likely to apply cost-to-serve analytics to different forms of logistics decisions, one of these being insource/outsource analysis. We are seeing more scrutiny of these types of decisions, and increased integration with network partners instead of new outsourced relationships.

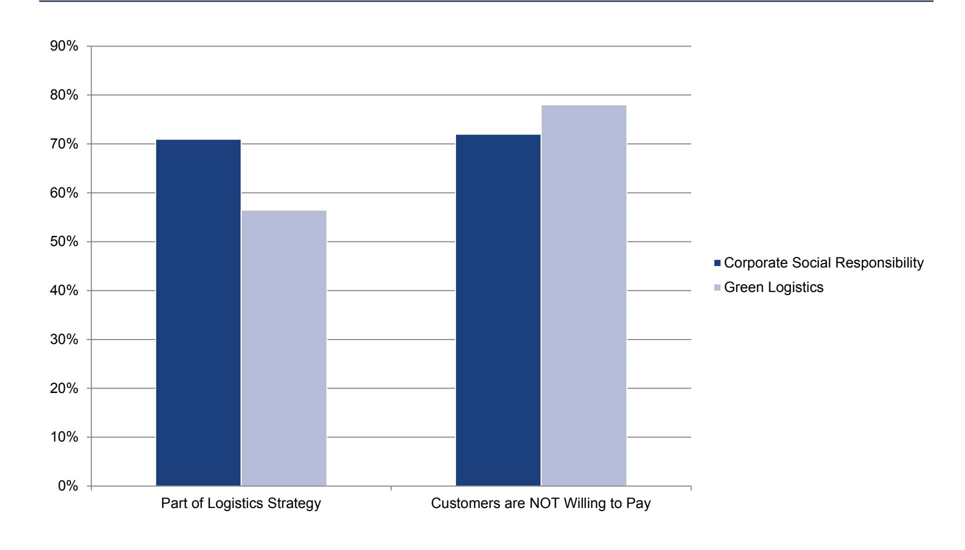
Strategy N3 – Horizontal/Vertical Cooperation: The Community, the Environment, and the Government

In this section, we have integrated the notion of COMMUNITY with the concept of NETWORK, in that the community is effectively a component of the firm's network. In effect, building a strong network requires that consideration of the impact on the community is implicit. As more organizations recognize the importance of environmental and CSR elements, the community becomes an important strategic element. The final strategic component associated with a network strategy is the extension of cooperative processes with organizations that are both within one's industry (horizontal) but also who are upstream or downstream in the vertical network. The latter is also an enabler of end-to-end integration.

This strategy is somewhat of a misnomer, as organizations are often unsure what is meant by "horizontal/vertical cooperation". In some cases, there may be some confusion with industrial anti-trust initiatives. In fact, cooperation refers in the case of this study to the concept of viewing other stakeholders in the network that are often not considered: the local human population in regions we operate in, the environment we operate in, and the governments under which we must operate. All three of these entities are impacted by logistics strategies, and as such, must be explicitly considered when these strategies are developed. Mature organizations recognize that these entities must be explicitly considered in their global logistics growth strategy, as they have important influence on the outcome and results of these strategies. We thus view sustainability and community strategies as a core element in horizontal/vertical cooperation, and also as a component of global logistics strategy.

The challenges of sustainability are numerous, however. As shown in Figure 37, a majority of organizations do indeed believe that sustainability is a core component of their logistics strategy. However, the majority agree that customers are generally NOT willing to pay a higher price for either demonstrated compliance with corporate social issues, nor are they likely to want to pay a higher price for a "green logistics" company. This is consistent with other research that shows identical results.

Nevertheless, as shown in Figure 38, sustainability issues will continue to be more important in the next five years. The number of organizations that will begin to measure suppliers' carbon dioxide emissions will increase four fold in the next five years, while the attention to internal logistics carbon dioxide emissions will double. Similarly, social issues will increase

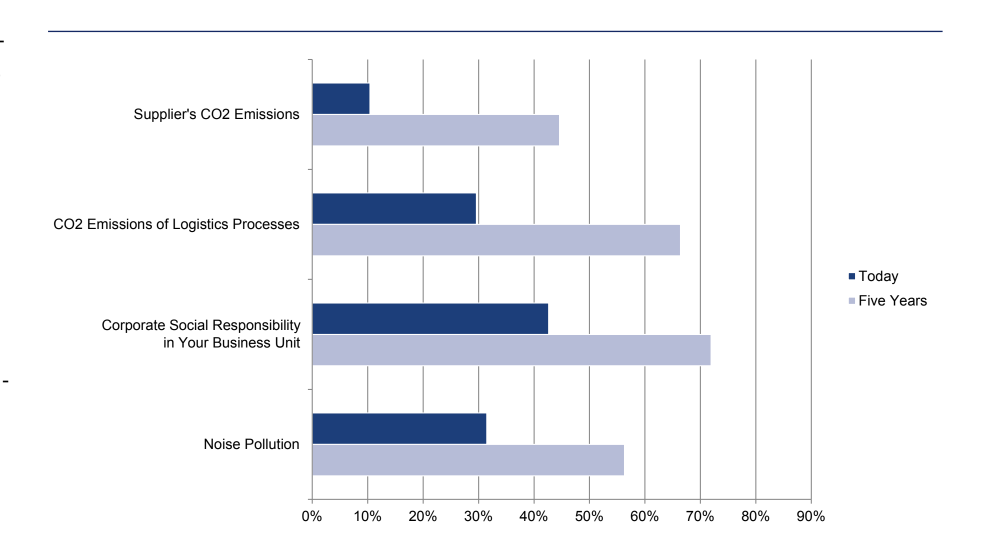


37 | Percent of Respondents Who Rate Sustainability Issues

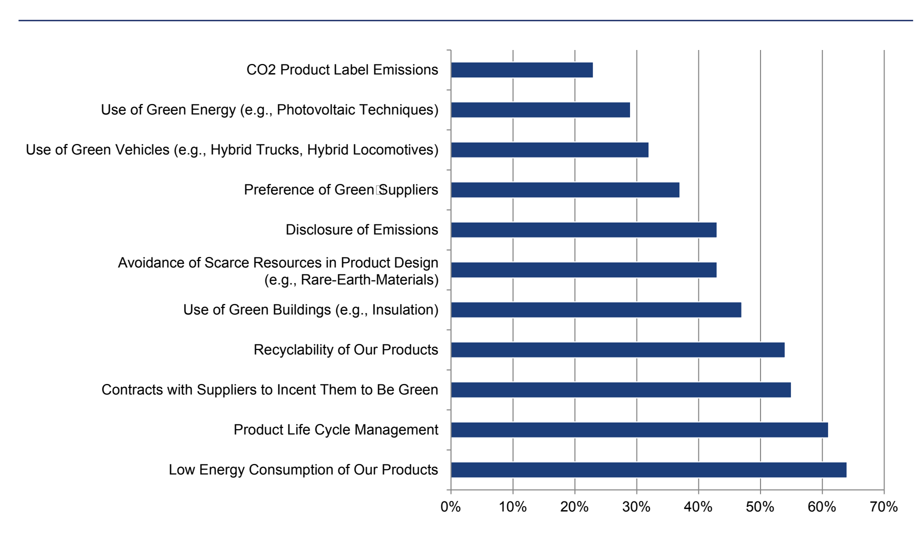
in importance, as the number of organizations focusing on corporate social responsibility and noise pollution will double in the next five years.

There is also evidence in Figure 39 that a large number of organizations are striving to make their supply chains "greener", through incentives to suppliers, studying consumption of products, life cycle analysis to study product disposition, recyclability, and use of green buildings. These and other strategies are an increasing emphasis on driving sustainable logistics strategies that consider impact on the environment and the community.

Organizations are also increasingly recognizing the need to collaborate with others in their industry to influence government regulation and investment guidance. Many government officials rely on organizational consortiums and industry groups for advice and consultation on what will provide the greatest benefits to their economy, their community, and the welfare of the constituencies. As shown in Figure 40, the most common set of issues that organizations in our sample are collaborating with government agencies on are industry standards, improving education of workers, improving logistics infrastructure, and influencing laws. All of these areas will see increased collaboration in the future.



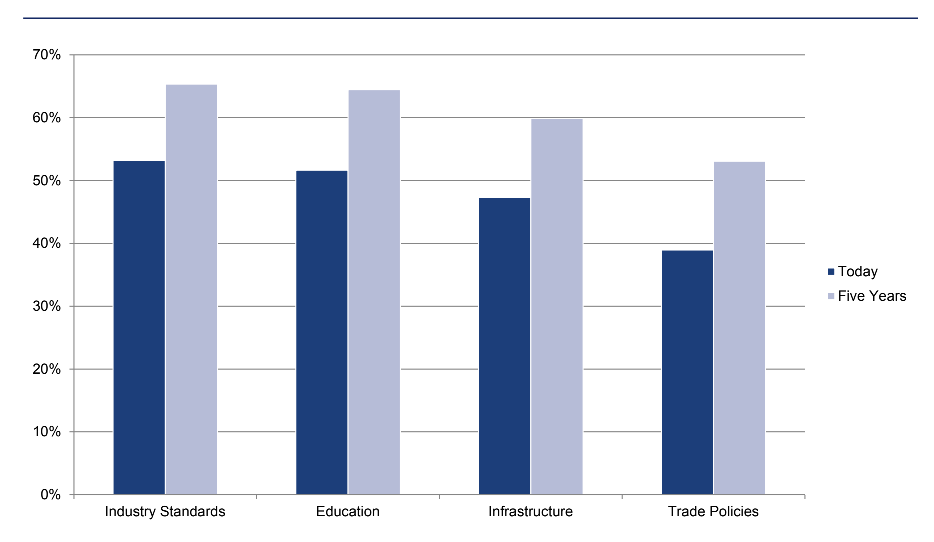
38 | Percentage of Respondents Measuring Different Sustainability Aspects



39 | Percentage of Respondents Planning Different Sustainability Strategies

More companies recognize that governments are increasingly a component of the supply chain, and as such, need to be included as partners if global logistics network design is going to be successful. This collaboration occurs in many forms, but in all cases must be planned carefully, as mistakes can prove to be costly not just to the brand, but to all future dealings with government regulatory agencies.

There is also a trend to work with government agencies to assist in creating "logistics clusters" and other approaches that will result in improved intermodal integration and coordination in global logistics infrastructure.



40 | Priorities for Government Collaboration (% Respondents)

More companies recognize that governments are increasingly a component of the supply chain, and as such, need to be included as partners if global logistics network design is going to be successful. This collaboration occurs in many forms, but in all cases must be planned carefully, as mistakes can prove to be costly not just to the brand, but to all future dealings with government regulatory agencies.

To have good networking and effective supply chains we need to have competent local partners that have a local network. It is especially important to have an understanding of the tax structure in India, as it is very difficult and can lead to problems in the supply chain process. Different states have different tax structures, and small changes in the regulations can have huge impacts on the supply chain. We also work closely with different government agencies in Japan and various countries to understand the government, and understand the culture.
[Indian LSP in Automotive]

We have a strong government department because we are based in China. We are used to interacting with government bodies to try and resolve things. It is often not successful, and very difficult. The government is the ultimate power in China, and you have to find a way to work with them. It is impossible to manage logistics in China without working with the government.
[Chinese Electronics]

In Argentina the import rules are interpreted differently by individuals, and you are subject to that version according to the individual who happens to be working that day. Some will look at a laptop and call it a GPS device – others will call it a telephone, and then turn around and tell you a telephone is a computer!
[Electronics]

We have discovered that Russia is one of the most challenging countries in terms of government regulations and corruption, and to overcome this you HAVE to go from the top down. Our CEO meets with Vladimir Putin once a year, and also meets with the Agriculture minister, the minister of trade and commerce, as well as the local governors and administrators in areas where we have operations. It is critical to get support at that level, and make government officials understand our long range plan to bring in investment, train people, and create a local supply base. Once they understand that, they send signals down into the government organization which allows you to get support at lower levels. Otherwise, if you try to only work down at the grass roots level, you are continually asked for bribes. But when these individuals are told from the top that our company is one they want to be successful, it immediately eliminates the red tape, the bribes, and expedites our ability to get work permits, gas connections, and local licenses. The bureaucracy and paperwork in Russia is staggering, and we are constantly working the relationships. We had to meet with the local governor every week to get him to allow us to build a road to our new factory!
[Industrial Manufacturer, Russia]

Top Performers are Greener

Our survey results suggest that top performers are more likely to adopt Green Logistics strategies than other companies. They also tended to rate corporate social responsibility as a more important part of their logistics strategy than other companies in our sample.

“BRIC” Country Specific Logistics Issues

It is interesting to also focus on specific strategic implications of logistics as companies expand into the major BRIC countries of Brazil, Russia, India and China. We conclude with some of these insights here.

India

The challenges for companies in India are incredibly difficult. These issues are enumerated below based on discussions with Indian logistics institutes and our interviews.

The logistics and supply chain management sector is very informal and fragmented and most of its actors are not very sophisticated. Especially in the big cities, there are a vast number of unorganized small truck owners and service providers for last mile distribution. Since many companies in the manufacturing sector are growing in size, non-core activities are being outsourced. City level warehousing is often given to small players who have their local warehouses, which then outsource warehouse management to other companies. Recently, the 3PL industry has been growing and holds a high value for multinational companies since warehouse owners will soon be offering a lot of value added services. In the trucking sector, the development of large fleet owners is increasing and many of them are moving into niche markets (e.g. dairy product distribution) and fairly sophisticated services.

Regarding risk or safety in the supply chains, it might not be easy to change the behavior within the informal sector towards more safety. Especially the human risks are a major issue in India compared to European countries. Providers mostly overload trucks and have an enormous rate of death since they mostly do not consider investing in security measures due to cost reasons. Concerning storage and warehouse related risks, the fragmented private logistics companies do not cooperate well along the logistics chains, what makes these risks to a big common issue. Safety laws do exist, but their implementation and enforcement is very problematic.

The tax structure in India is a further problem. When crossing borders between states, trucks often have to endure long waiting times at checkpoints because most states have different tax structures. Some states only charge an entry tax, but at most borders all the freight papers need to be checked due to sales tax issues between the states. In addition to that there are also tolls for road usage.

India has to expand and improve its infrastructure and further interconnect the existing infrastructure in order to optimize the material and traffic flows, especially for commercial traffic. The loading on seaports and airports is very inefficient, mostly due to issues with the responsible authorities.

The Indian railways are still a monopolistic organization with a huge network and an integrated system with 16 zones and 75 divisions, which is not yet ready to be opened up for private ownership. This institution is a department of the government and a huge entity with approximately around 100,000 employees. However, it is only one single inflexible company that has difficulties in securing partners.

The use of inland waterways, primary in the east, connecting Kolkata and the ports in Orissa to the mines, has been explored, but inland waterways have been a huge failure since the water levels are too low and fresh water is rather used for consumption and agriculture than for transportation.

In India, local content is defined as a percentage of the overall product value. In Brazil, there are very specific details on which components in the product must be localized, and how deep into the bill of materials it needs to go. Other countries have a mixture of both – and many countries are looking to China when seeking to build their local content regulatory model. However China (as well as others) are constantly changing the rules every few months, which makes it very difficult for an OEM. It is impractical to come in and "tell" people that their system is silly. Managers increasingly need to accept the way that these local officials are setting the rules, enter the game, and play it! [Indian Automotive]

India is now looking at reforms from a state-wide to a country-wide tax structure. When this is implemented within the next five years, probably the entire supply chain will undergo big changes. These changes will drive a lot of large warehouses, and many new businesses to manage these warehouses. There will be an increased call for automation and a lot of new technologies and warehouse management solutions. Companies will need to change their business models so get closer to the customer, with more cross-docking. Customers requirements will drive local stocking points and new shipping solutions. [Indian Manufacturer]

Today, warehousing and rail-road interfacing are major issues for sustainability and transport costs. Regarding the promotion of intermodal transport, researchers depend on the decisions of policy makers. An intermodal approach is not yet planned in India so that there is not much significant work being done to improve logistics nodes and promote intermodal transport.

The development in the transportation sector is a major improvement. It is growing about 10% per year, but only in scale. A lot of freight was done by rail in the past, but now truck transportation is increasing, because the roads have been improved. Also, the truck sector is growing faster than the railway sector and private seaports are coming up. The greatest potentials are in the intermodal logistics nodes for transport networking and transport distribution since there also is some political interest in this area. In this context, PPPs (Public Private Partnerships) are a key issue. The objective is to involve the private sector in road infrastructure improvements since commercial traffic would get facilitated this way.

Urban freight logistics is a big area of concern where not enough is being done. In cities like Ahmadabad or Delhi, during the day, trucks are not allowed on the main roads. One problem is that trucks come in the night and create massive traffic congestion since they all start moving at the same time (in Delhi for example). The other problem is that there are additional handling issues for larger trucks since they are not allowed inside the city. In this context, warehouses around the city need to be booked in order to move the goods to small vehicles for retail distribution. As a result, urban last mile distribution is a huge issue in India.

There are many activities in the area of cold and food chain management due to increased government initiatives and funding in this area. Warehousing in food supply chains is a very big problem in this case. Agricultural supply chains are rather unorganized and inefficient and the public distribution system in food supply chains is not very effective either. There is a lot of wastage during storage, lead times are high and security issues are not considered. So finally, the agricultural, processed food and cold chains need to be improved significantly.

Even though the logistics sector is growing, whether it is roads, aviation, railways, containers or intermodal transport, the number of students and the technical knowledge in the sector is very low. In the areas of logistics there is a great need for education, but there are not enough institutions that offer training in logistics. However, skill development efforts in the transportation, warehousing and packaging sector are an important trend. Not only skills, but also attitude and behavior are important in managing supply chains and need to be dramatically improved.

In the last 20 years, India has experienced about 800 natural or man-made disasters. Since India is geographically large and many areas are difficult to reach, especially when disasters strike, disaster relief becomes a logistic challenge. Currently, the question of how to design and manage disaster related logistics efficiently to reach the people in need as fast as possible, is a very important topic in logistics research.

How will companies conceivably manage these barriers? Our interviews suggest that companies are organizing differently using multi-local operations, moving away from centralized approaches to regional capabilities, but with global planning. Close collaboration with LSPs who understand the environment, and who employ GPS and other technology to overcome the issues is one way. However, retailers entering these regions may need to “build their own supply chain” solutions, working with local LSPs who understand the market and can mitigate the risks using innovative technologies. This will also require close collaboration with government. For example, India has mandated that foreign supermarkets invest a minimum of $100 million in capital, with 50% going into back-end infrastructure such as cold storage and transportation.

China

The Chinese government has made great strides in improving logistics infrastructure in China. The government can influence the logistics market but can’t dictate the market operations. In fact, the logistics industry is one of the most deregulated industries in China with few exceptions such as railway. Interviews with a number of Chinese government officials, as well as with a number of senior executives at 12 Chinese State-Owned Enterprise(SOEs) provide insights into some of the major trends that are occurring in this market that is often not transparent to global executives.

First, government officials predict that e-commerce and logistics are two major industries that will interact and impact each other closely. E-commerce has taken off in China and is growing exponentially. However, logistics is the bottleneck, as lack of efficiency has hindered the growth of e-commerce. Government has begun to recognize that logistics channels must become more streamlined in order to achieve healthy and long-term growth in e-commerce sector. Although B2C e-commerce is most visible to the public, the level of Business to Business (B2B) e-commerce constitutes the majority of transactions.

In general, the 3PL industry still significantly lags the growth of manufacturing. Chinese manufacturing technology and quality is improving rapidly. However, logistics services still lag Western levels in terms of service scope, processes, quality, etc. In fact, logistics inefficiency has reduced Chinese manufacturers' global competitiveness both at home and overseas. Chinese products compete largely on price not on quality, but there is increasing focus on the importance of logistics in these markets. Interviews we conducted with senior Chinese government officials acknowledge that although major routes are covered by major logistics companies serving these markets, there is room for growth in the B2C low-end e-commerce delivery. All the major logistics companies including the carriers and forwarders have a presence in China serving major industries.

The lack of logistics capability will continue to be a major barrier to economic growth in China. The Chinese government is making a strong effort to transform the country from manufacturing-centric to increased value-added industries, and is seeking to invest more in high value-added production and services. Even in the last 5-year plan period during 2006 to 2010, logistics industry is regarded as one of the pillars supporting the growth of the economy. Overall the Chinese logistics industry suffers from higher costs, due to many reasons which are not under the control of the industry, (e.g., high gas prices, high toll charge).

An imbalance across geographical regions will also exist for a long time. While government is pushing the "Developing the West" initiative to help the economic growth in inland areas, there still exists significant gaps in terms of logistics infrastructure and capabilities. This will remain a challenge for quite some time.

China emerged in the last two decades as the center for high volume, low-cost manufacturing. In some cases, there are also signs that the Chinese manufacturing engine is beginning to wane. The number of foreign-owned factories, the pool of migrant labor, and materials suppliers upstream and downstream from manufacturers have all slowed or have been significantly reduced.[17] On the other hand, a senior Chinese official suggested that anecdotal evidence suggests that there is some corresponding growth in manufacturing activities for the domestic marketplace. These are dominated by domestic investments in less concentrated and lower labor cost areas in Western and Northern China. Consequently, it is evident that the two export deltas (i.e., Pearl River Delta, Guangzhou area, and Yangtze River Delta, Shanghai area) are bearing the brunt of the declines. However, the domestic manufacturers in the Western and Northern parts of China are smaller in net volume and value relative to the exporters they replace. Overall, it would seem that China is consciously giving up a lot of its traditional labor-intensive manufacturing and assembly businesses – at least in the short term.

Currently there is no viable volume replacement for Chinese made consumer products. However, we may yet see a resurgence of Chinese export manufacturing in the long term when the following conditions hold: (1) the United States and Europe experience their recoveries; (2) the consumption habits of Americans and Europeans do not change; and (3) China improves its manufacturing efficiencies with automation. To compete in the global market, it is likely that the Chinese manufacturing sector is going to invest heavily in automation and information technology to improve its supply chain operations. As the manufacturing sector becomes more sophisticated, it is plausible that Chinese manufacturers will compete on value instead of cost by focusing more on producing complex products with higher profit margins.

Today, most consumer products manufacturers adopt a "China plus 1" sourcing strategy. They are still making a lot of products in China, but they are also developing and testing alternatives to China. The result is a net reduction of Chinese export volumes. Lower cost commodity types of products will flow to lower cost countries. At the same time, more complex and higher cost manufacturing is also flowing into China.

Chinese manufacturers have for the longest time been treating their workers as "manufacturing commodities". A heavy-handed management style – while effective in the past – is no longer appropriate to manage younger Chinese workers. Having the advantage of more educational opportunities and being a product of the "one child policy", today's Chinese youth are less willing to work under a harsh working environment. To be successful today, the new Chinese factory environments will have to be more capital intensive with more labor-saving automation, and blue-collar workers must be given training, learning, and advancement opportunities. These more enlightened workplaces will gradually satisfy western consumer demands. However, a lot of the improvements on the factory floors are not so much in response to Western consumers, but a response to the demands requested by those vocal and powerful Chinese factory workers.

There is great awareness that the traditional roles played by Chinese factories are low in value creation. The Chinese response in recent years is to take advantage of current Western market weakness to purchase western intellectual property, and to import changes to the traditional education system to create more entrepreneurs, designers, and brand managers.

Brazil

The Real Plan (or Plan for the Economy Stabilization) was introduced in Brazil in 1994 by the former Brazilian President, and is certainly one of the most successful stabilization plans on record. It reduced Brazilian inflation from hyperinflation levels (i.e. rates greater to 50% monthly) to rates that were less than 20% per year within a very short period of time and minor dislocations. The program, seen in light of its key building blocks, comprised all the usual elements found in stabilization experiences, including a strategy for fiscal fundamentals, along with the removal of supply side constraints enhancing inflationary pressures. It also included a device to perform de-indexation or a coordinated price/contract conversion to a new stable currency. The Real Plan comprised (i) a fiscal strategy centered on the approval of a Constitutional Amendment creating the Social Emergency Fund, (ii) a monetary reform process to take place during a few months of voluntary adoption of a new unit of account later to become the national currency, and (iii) a "big bang" approach towards opening the economy with aggressive trade liberalization and a new foreign exchange policy. However, Brazil still remains a relatively closed country when it comes to imports and exports, and this is reflected in the challenges experienced by executives seeking to build networks into Brazil.

In automotive, most suppliers are locally owned. Large foreign brands all have domestic production facilities and have 90-95% local content on big models. However, premium vehicles come from overseas, but often have 35% import duty and 25% taxes, so global competition is still not on a level playing field. [Automotive]

Regulatory issues associated with product shelf life cause a lot of write-offs of our product in Brazil, due to the 6 month shelf life restriction. This becomes very difficult when we deal with the high cost of written-off goods and the product we need to destroy. Our corporate executives don't understand why this cost is so much higher in Brazil than in other countries. Compared to other countries I have worked in, Brazil is very difficult to do business with. In consumer goods you can do a lot of production locally, but the cost of developing a factory in Brazil, let alone a new molecule, renders the payback unfeasible. Faced with the options of producing locally or importing, importing is risker, however, and we have to manage a supply chain where 100% of our production is imported for re-packing. [Pharmaceutical]

Russia

Russia is one of the most mysterious of the BRICs in terms of accessing its logistics industry. In 2012, Russia became a member of the World Trade Organization and its has since improved economic collaboration with neighboring countries. Consequently, companies could benefit from market liberalization and harmonized regulations and this could result in increased logistics activities. For example, the number of standard containers transported between Hamburg, Germany and Russian ports has already increased substantially in 2012.

However, the Russian logistics market is still mainly focused on transportation services rather than contract logistics. Although global supply chains could benefit from railway connections between Europe and East Asia, infrastructure and regulatory obstacles still impede railway routes from becoming a real alternative to ocean routes between these regions. International LSPs have begun to offer services in Russia and, in doing so, they are increasingly focused on domestic customers rather than just offering transnational services. It can, thus, be expected that competition in the Russian logistics market will continue to increase.

We interviewed only a handful of companies who have begun exploring operations in Russia, and many are exploring how best to cope with this situation.

We have experience in working with different BRIC countries, and in general each country behaves differently based on the maturity of their supply chain. In countries such as India, China and Brazil, there is already a strong automotive presence so we can leverage the capability that is already developed. Russia is different, because suppliers for the old Soviet industries have not yet developed the quality that Western companies expect. Once you get away from Moscow, the quality simply isn't there. So we have to create new supplies, or encourage suppliers to move with us to Russia and set up operations. The biggest cultural issue in Russia is the mindset around quality and getting the job done – what we call "how do we do business". Getting people to conduct themselves with integrity, with no bribes, and honoring the contract is a big challenge. We spend a lot of time training suppliers on how to work as a partner." [Industrial Manufacturer]

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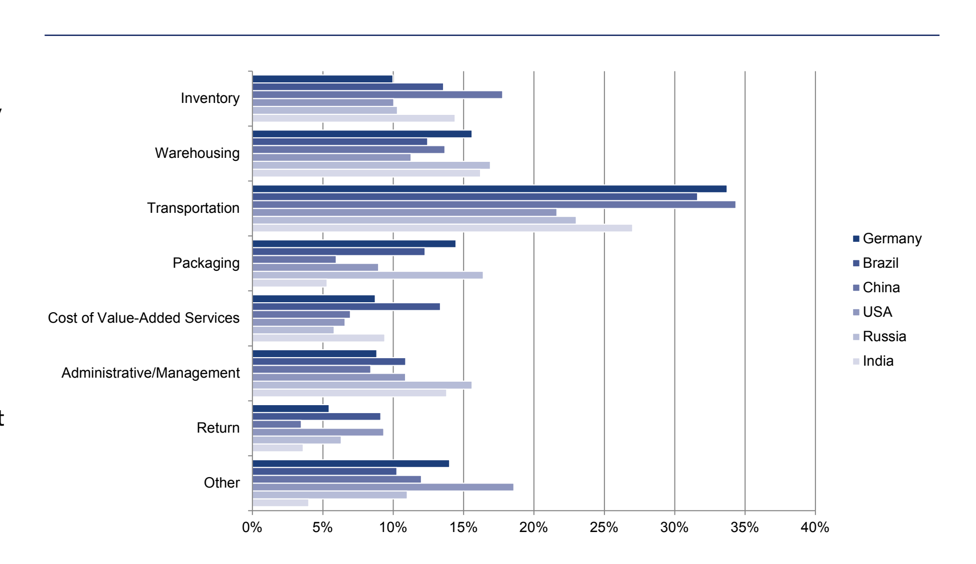
17 Walmart's Former COO And POMS 2011 MKS Excellence In Practice Award Winner Edwin Keh (葛儀文) Shares His Insights About The Future Of "Made in China", Interview conducted by Christopher Tang in Hong Kong, September 1, 2012, UCLA Blog, accessed January 5, 2013.

Appendix A

Cross-Country Comparison

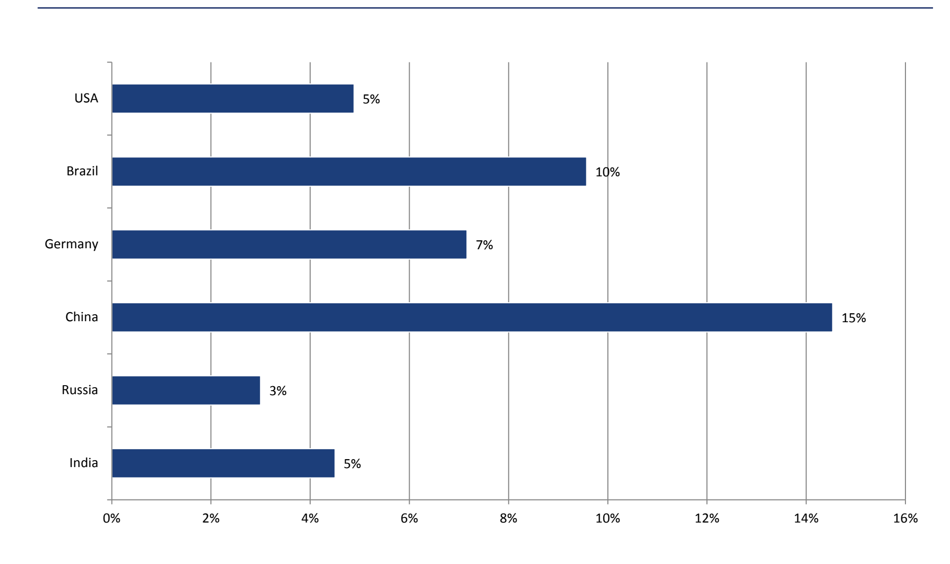
In order to highlight specific trends and strategies for selected countries, we have compiled some interesting cross-company analyses in this appendix.

The distribution of total logistics costs is generally similar between different countries. Transport costs are the main drivers of logistics costs in all regions. However, transportation costs are relatively lower in the United States and Russia and inventory costs are relatively high in China. Cost of value-added services and packaging costs are relatively high in Brazil and Germany, respectively.



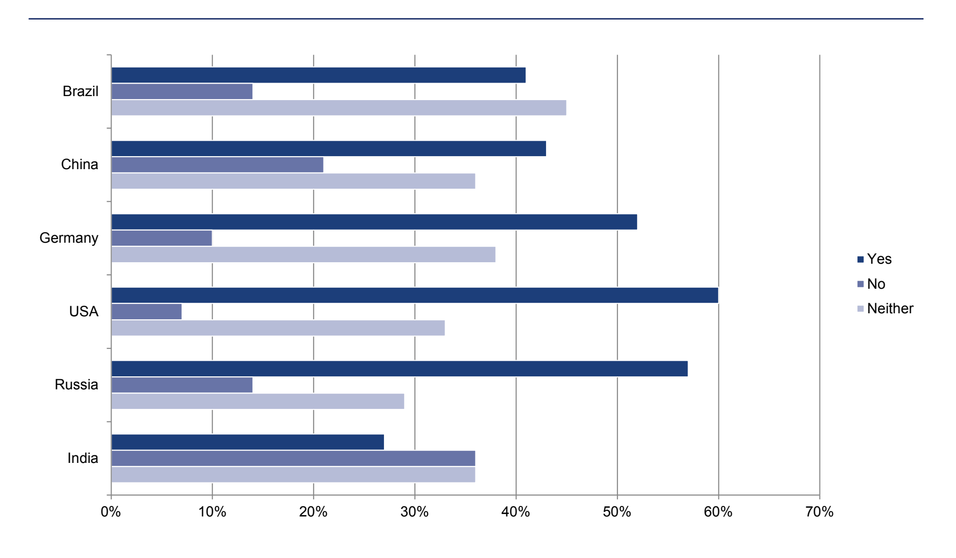
41 | Distribution of Logistics Costs by Region (% by Country)

There are still significant regional differences in logistics costs. The regional differences can be partially explained by the different conditions in particular in regard to the local logistics infrastructure and by the degree of maturity of the local logistics markets.

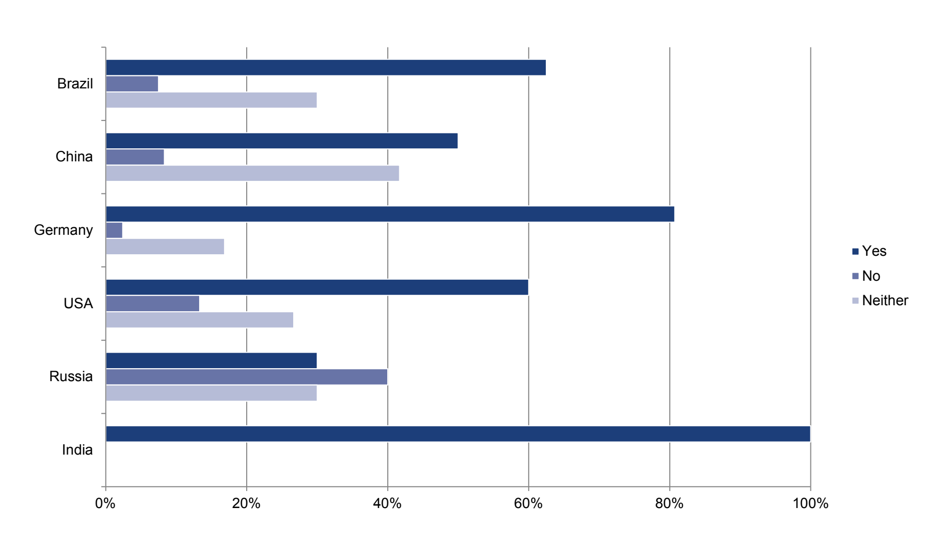


42 | Logistics Cost as a Share of Total Costs by Country (%)

In Germany, Russia and the United States customers are more satisfied with logistics service providers than in Brazil, China and India. In Germany, providers overestimate their own performance, as their customers are less satisfied than assumed.

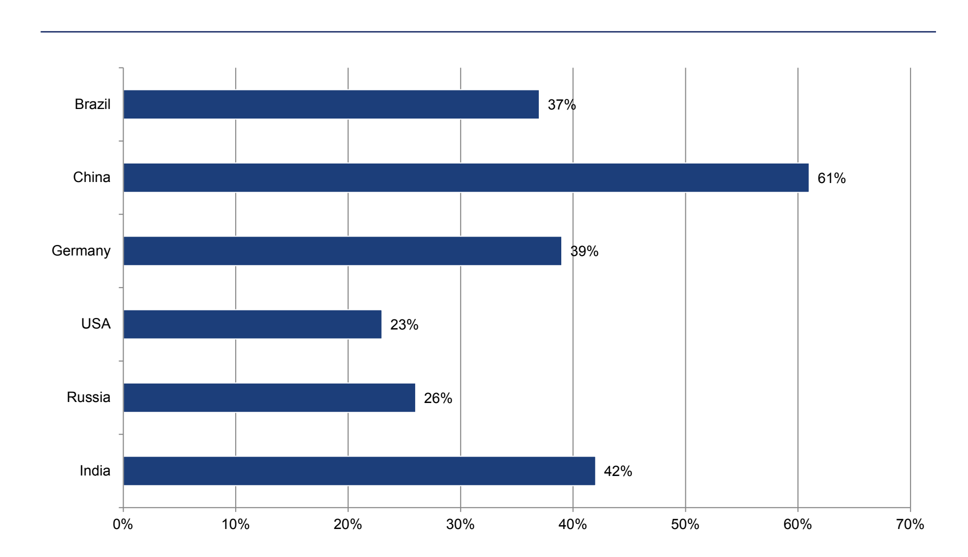


43 | Are You Satisfied With Your LSP? (% by Country)



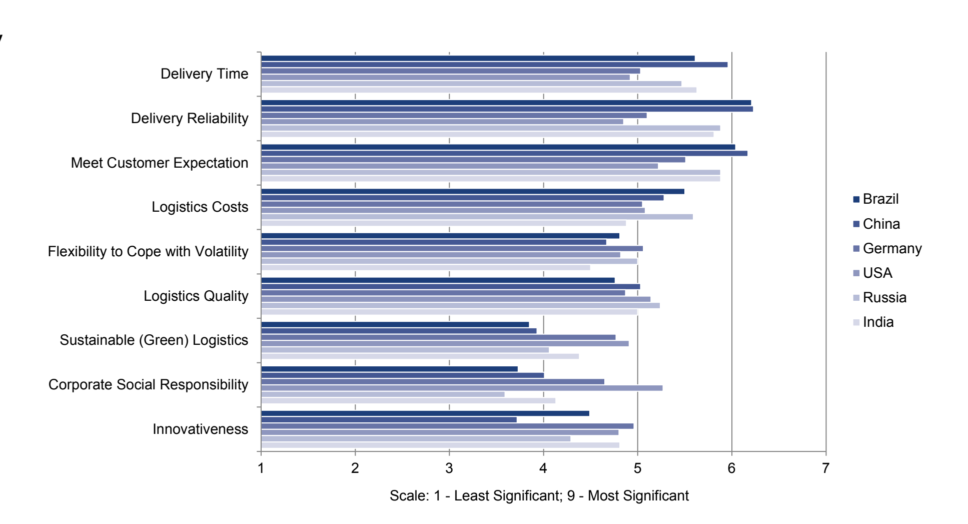
44 | Is Your Customer Satisfied with You (% by Country)

Big differences can be found across the selected countries in terms of percent of activities outsourced. While Chinese respondents state that much more than 50% of logistics is outsourced, this value is less than 30% in Russia and the United States. The values for Germany, India and Brazil are close to 40%. A reason could be a traditionally different understanding of logistics functions considered for estimating outsourcing percentage.



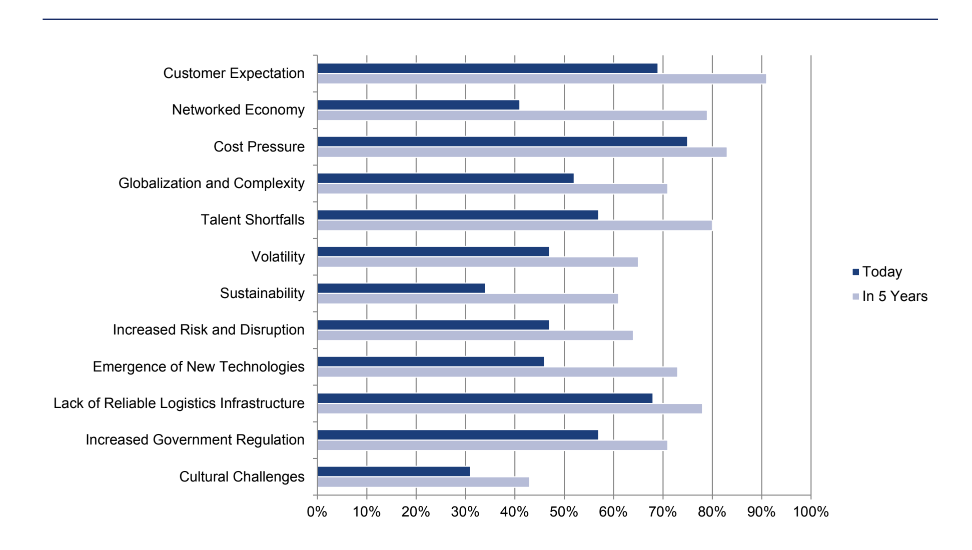
45 | Logistics Activities Outsourced (% by Country)

Traditional logistics objectives like delivery reliability, delivery time and costs prevail globally. In view of insufficient logistics infrastructure, these objectives rank particularly high in emerging markets like Brazil and China.

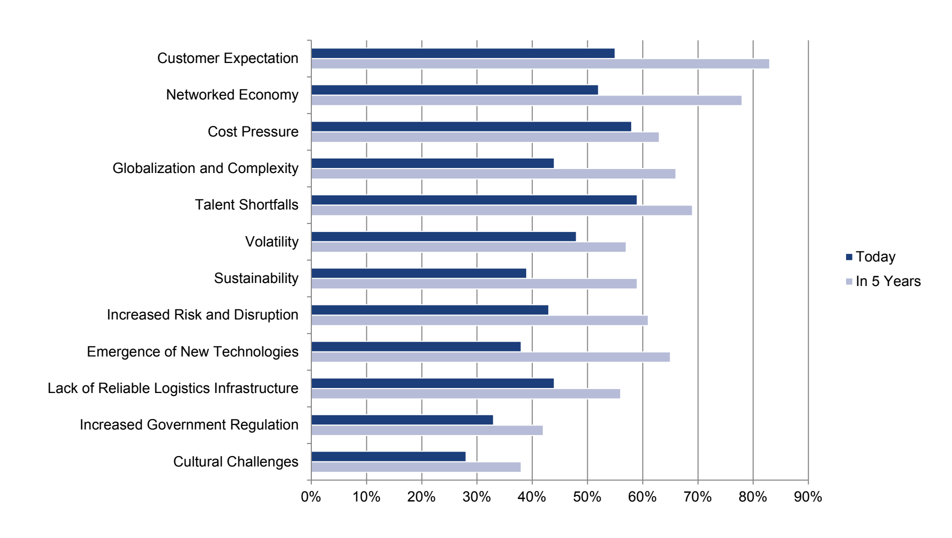


46 | Logistics Objectives (% by Country)

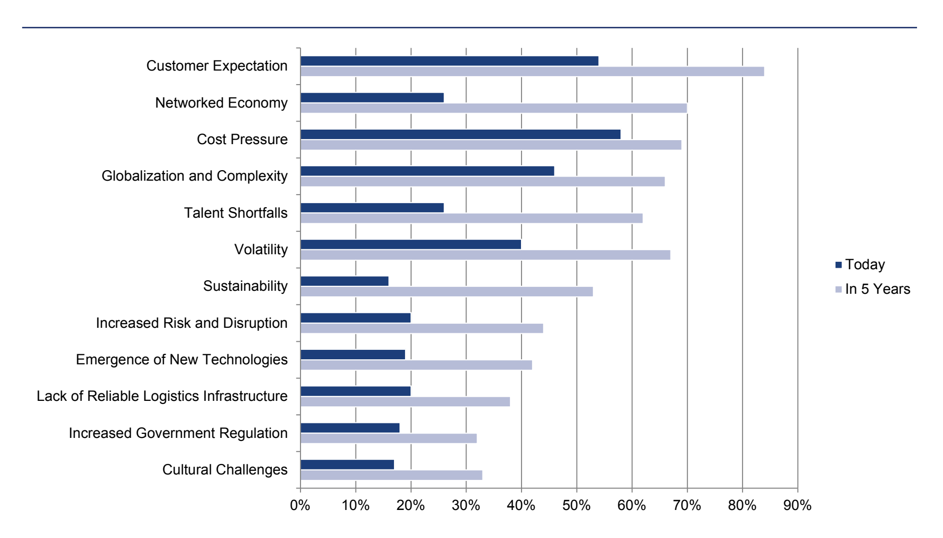
In this study, we have defined a trend as a shift or change that is moving in a general direction across the global logistics landscape. Therefore, by definition, these trends occur worldwide. However, due to different network and environmental characteristics across different regions, these trends may have different priorities. These difference are summarized in the following Figures.



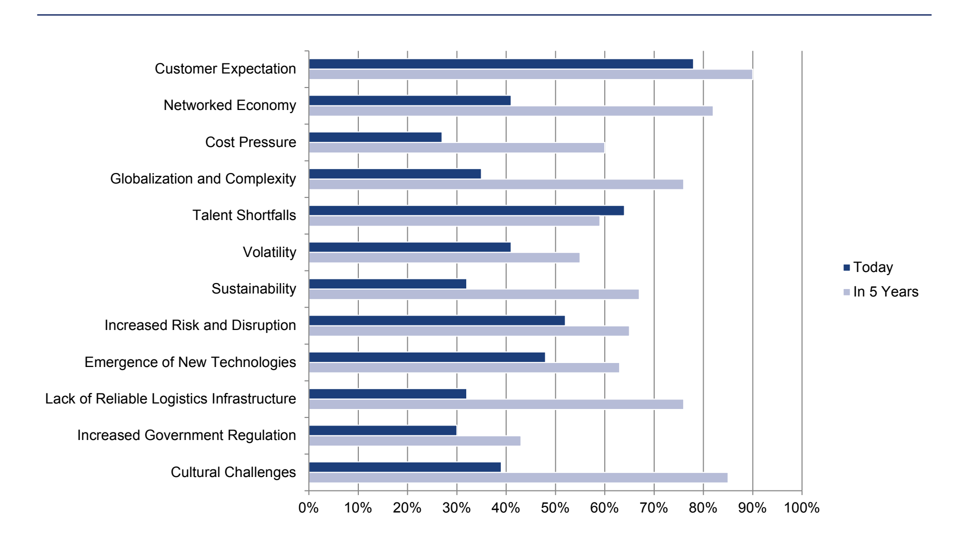
47 | Regional Trends in Brazil



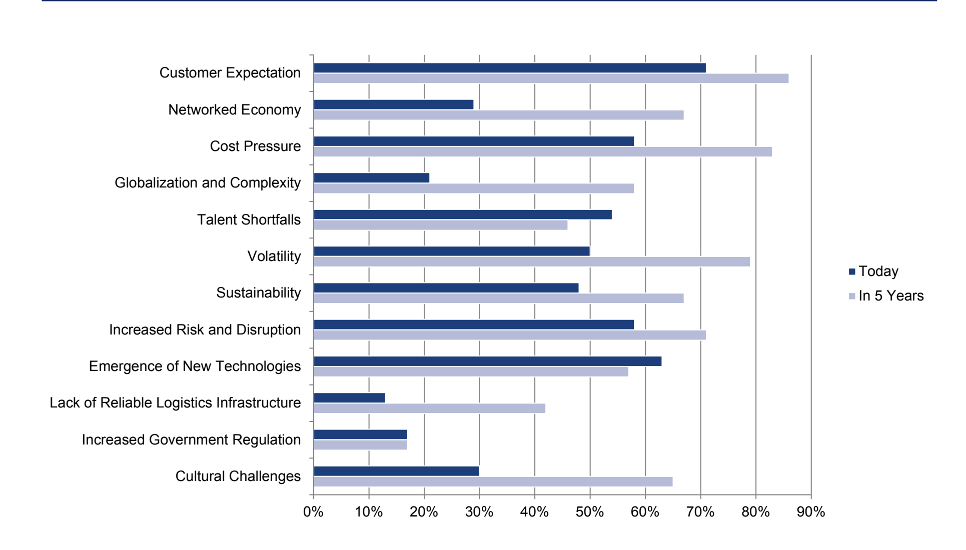
48 | Regional Trends in China



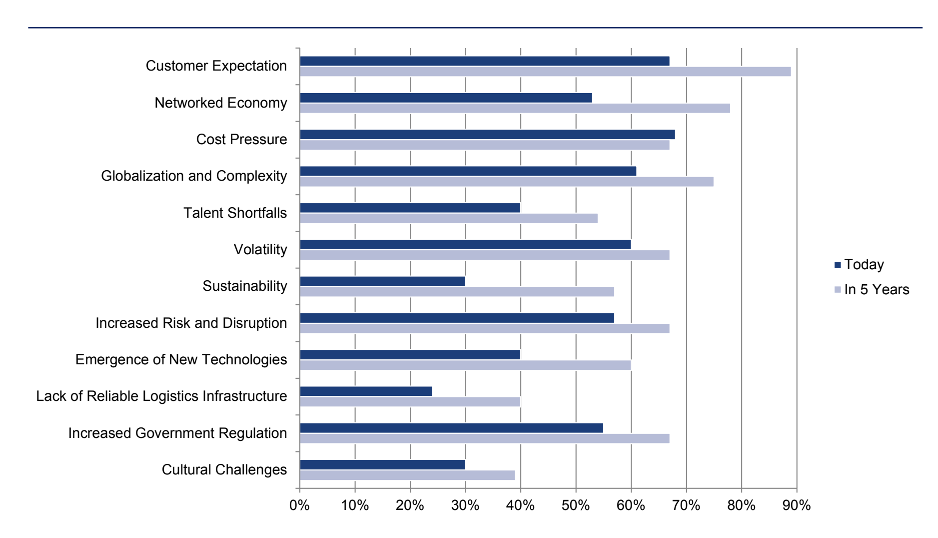
49 | Regional Trends in Germany



50 | Regional Trends in India

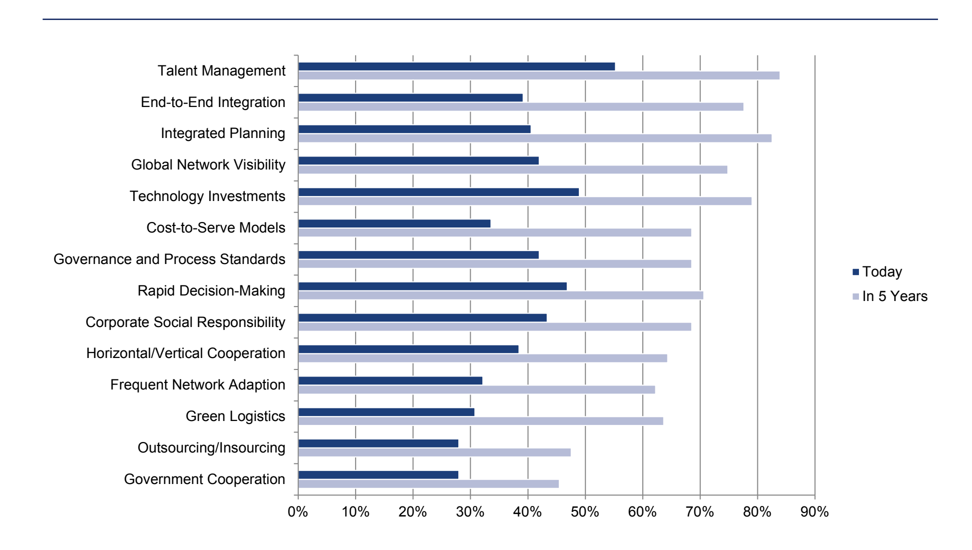


51 | Regional Trends in Russia

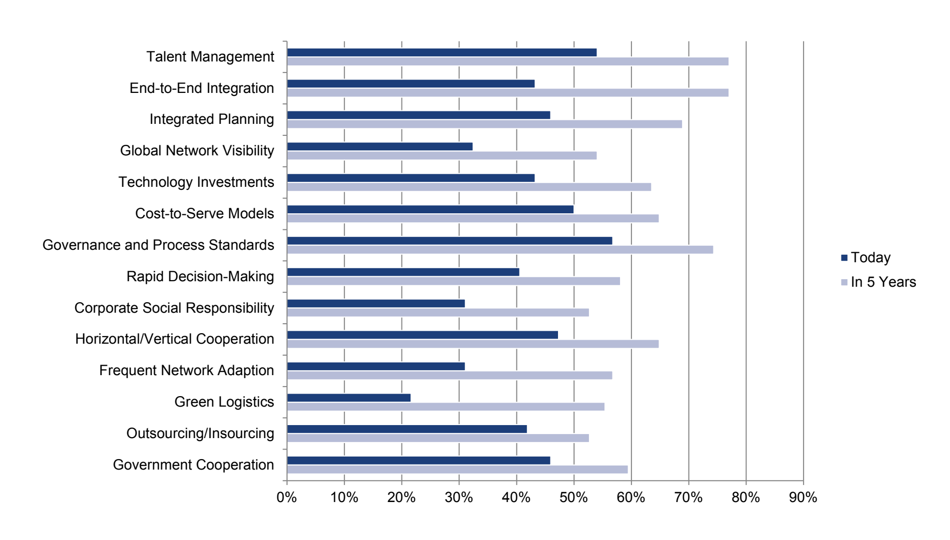


52 | Regional Trends in the United States

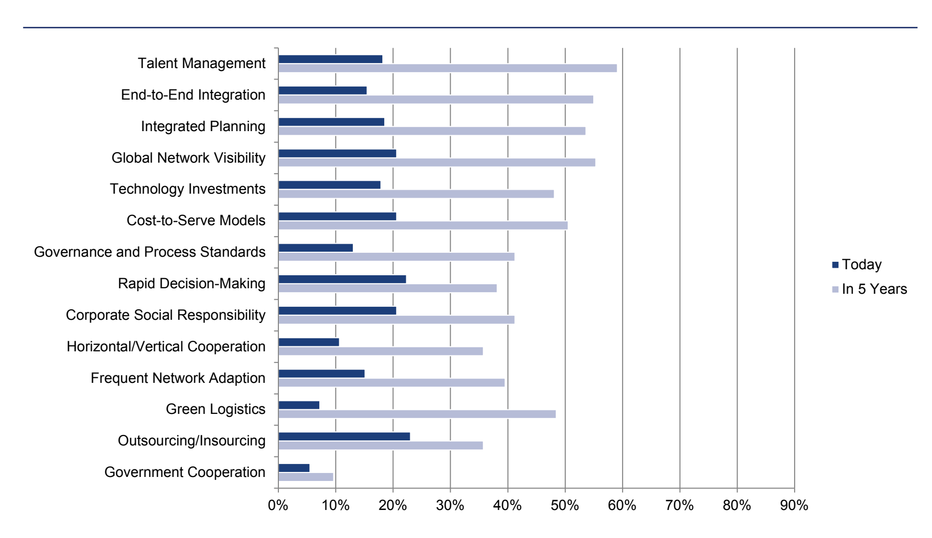
Similarly, differences become apparent when comparing the importance of strategies between countries. In China, governance and process standards turn out to be the most important strategy. Talent management is the most important strategy for Brazilian respondents. Outsourcing/insourcing strategies are the most important strategies in Germany. U.S. companies rate global network visibility highest.



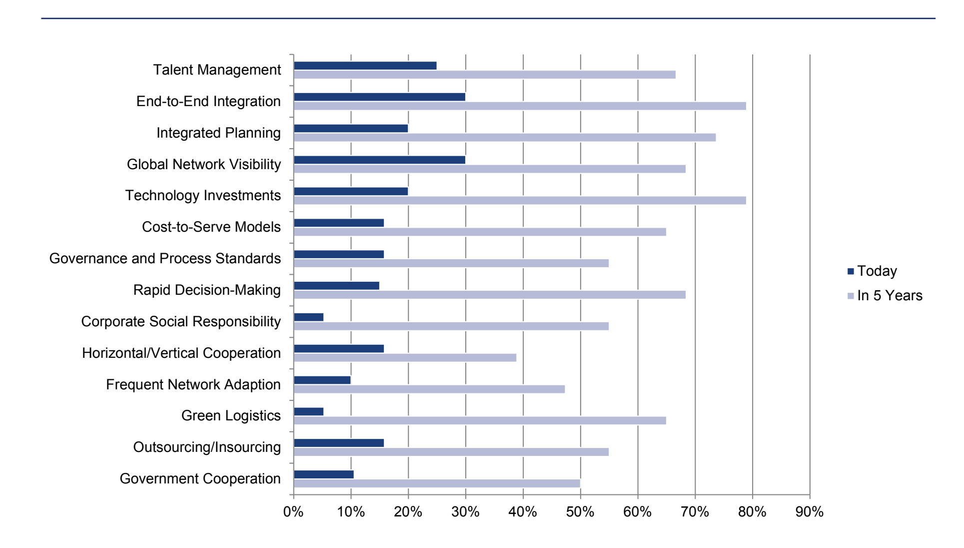
53 | Regional Strategies in Brazil



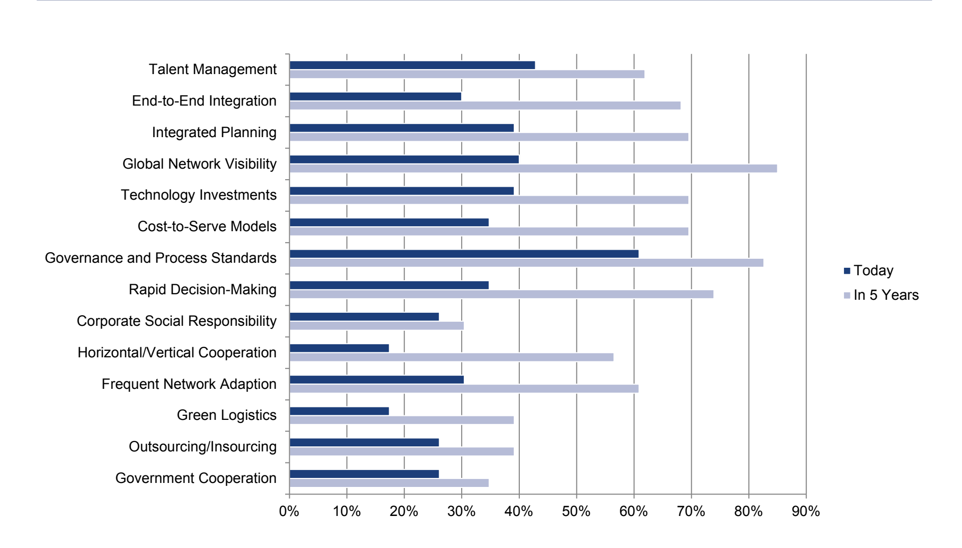
54 | Regional Strategies in China



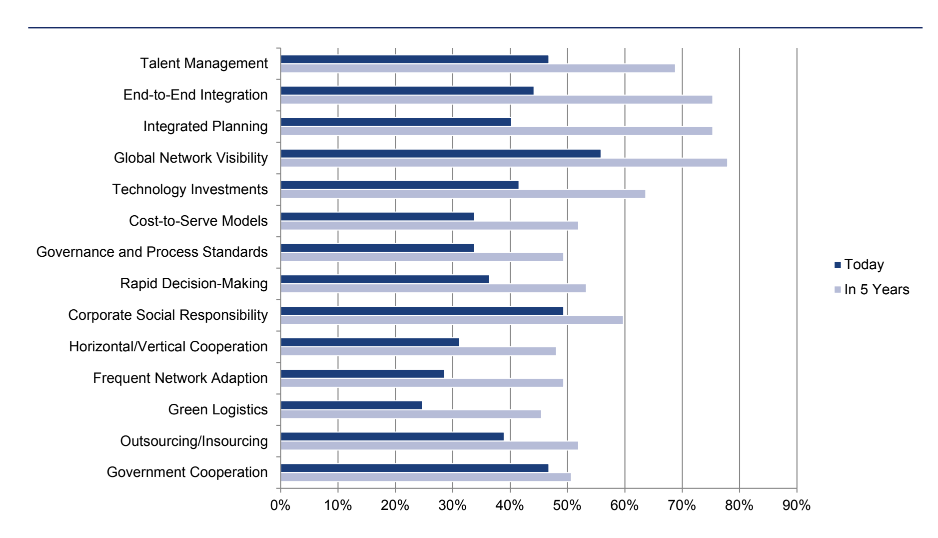
55 | Regional Strategies in Germany



56 | Regional Strategies in India

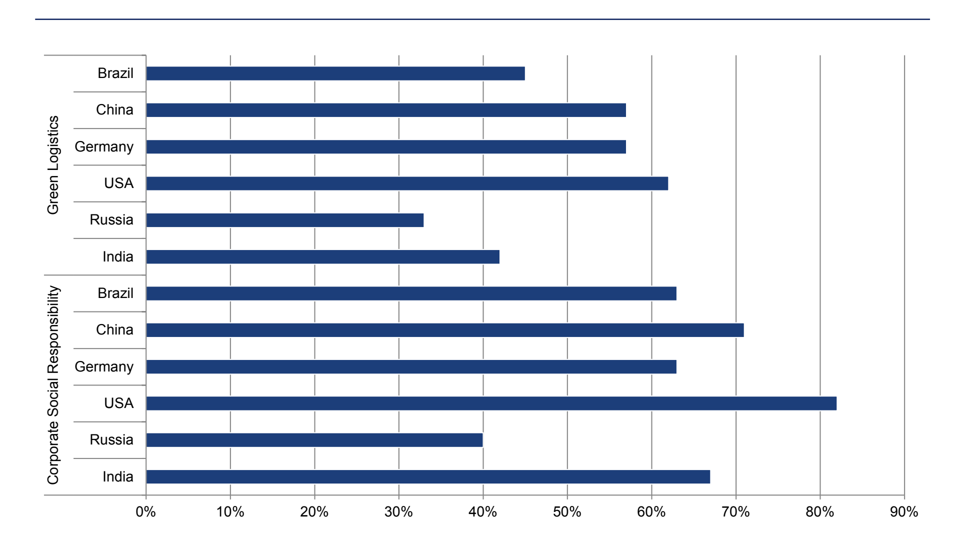


57 | Regional Strategies in Russia



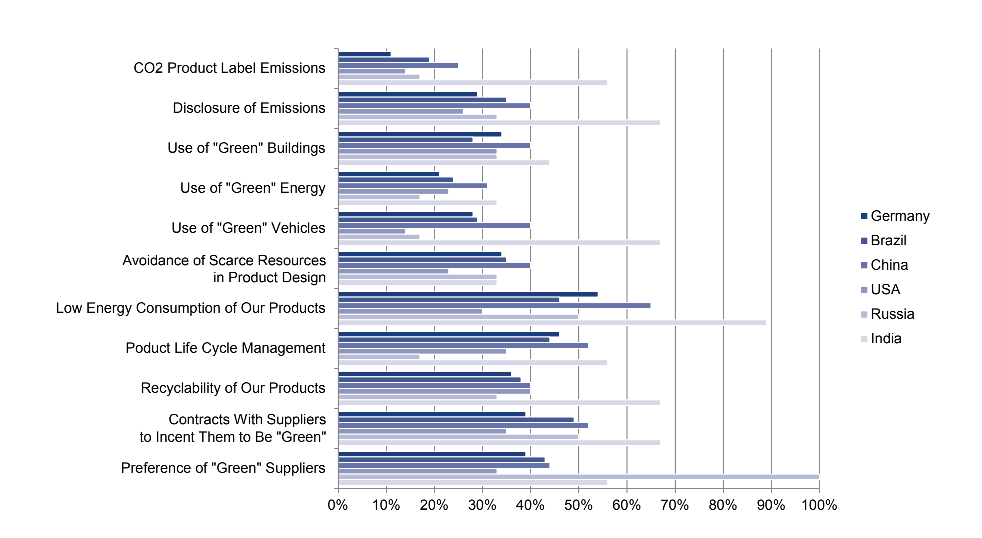
58 | Regional Strategies in the United States

In view of climate change and social scandals, logisticians have integrated green logistics and corporate social responsibility into their logistics strategies. U.S. companies turn out to be CSR pioneers, whereas many Russian companies are lagging behind their counterparts from other major markets with respect to both green logistics and corporate social responsibility.



59 | Green Logistics and CSR by Country (% Respondents)

There is a clear focus of product-related activities in all regions. Surprisingly, a strong focus to integrate suppliers into sustainability action plans can be observed in China. Concerning logistics related activities, the implementation of green building concepts is the most common measure.



60 | Green & CSR Based Initiatives by Country (% Respondents)

Appendix B

Cross-Industry Comparison

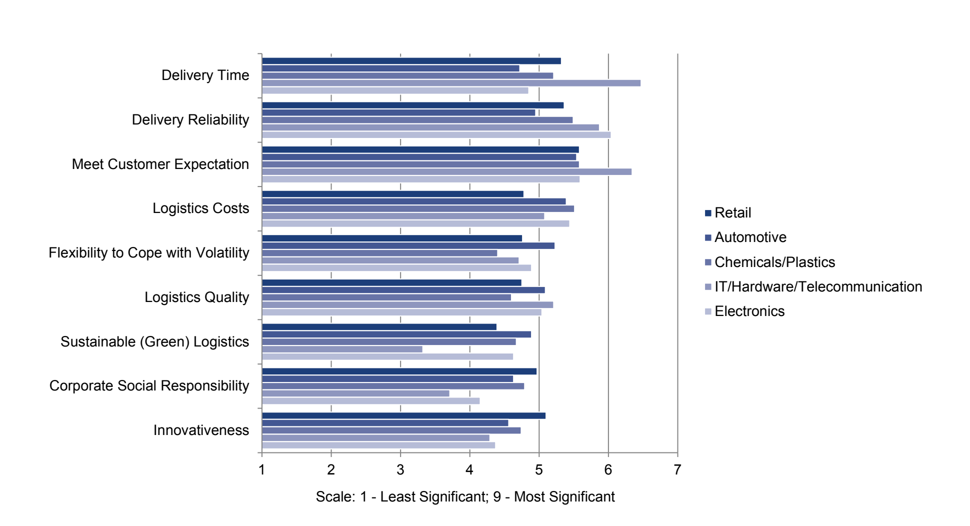
Differences between industries exist for several trends and strategies. The following pages contain selected charts to make some of these differences visible.

The highest degree of outsourcing can be observed for companies from the machine and plant engineering, FCMG, and chemical/plastics industries rather than in hightech industries. As in previous studies, the percentage of outsourcing is lower for retailers than for manufacturing companies.

Industry	Percent
Retail	29%
Machine and Plant Engineering	52%
Automotive	41%
Fast Moving Consumer Goods	52%
Chemicals/Plastics	50%
Hightech	37%

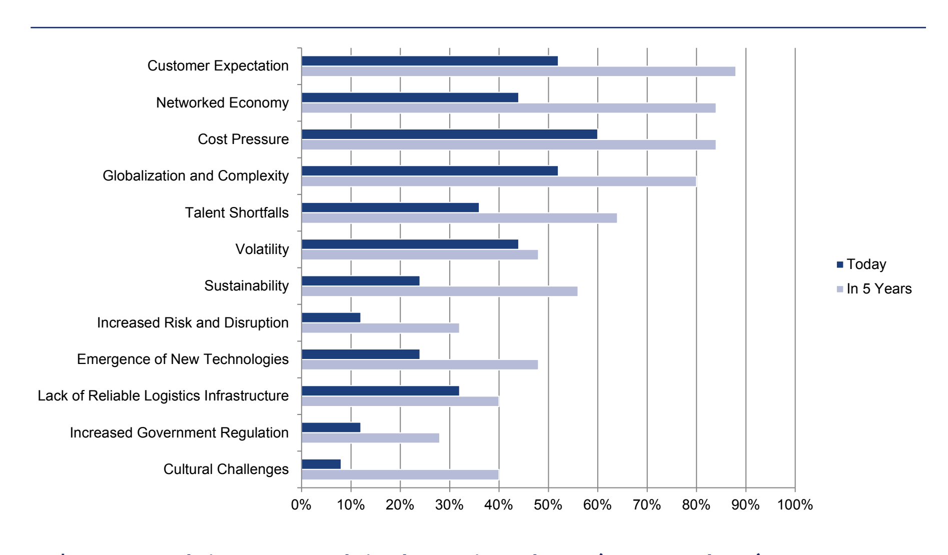
61 | Percent of Logistics Activities Outsourced by Industry (%)

The increase in logistics complexity is reflected in a multitude of different objectives. No real “pioneer industry” could be identified for certain goals. However, minor differences indeed exist for delivery time and meeting customer expectations, which are particularly important for IT companies due to short life and sales cycles, whereas sustainability and corporate social responsibility are less important for companies in the automotive and electronics industries.

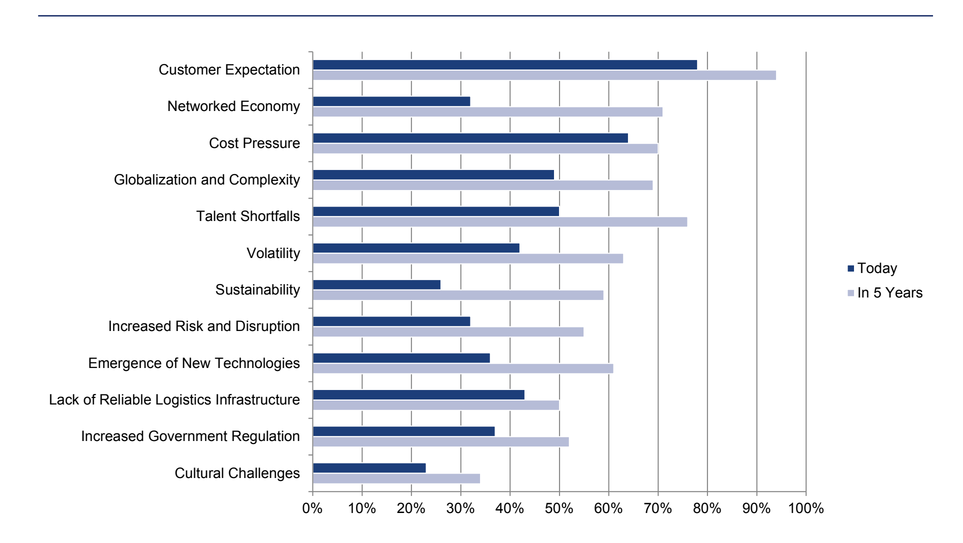


62 | Logistics Objectives by Industry

We found a general pattern for trends with only slight deviations for certain manufacturing industries. As an example, the following Figure highlights trends observed for the electronics industry. Still, it becomes apparent that customer expectation is particularly important for logistics service providers, as can be seen in Figure 64.

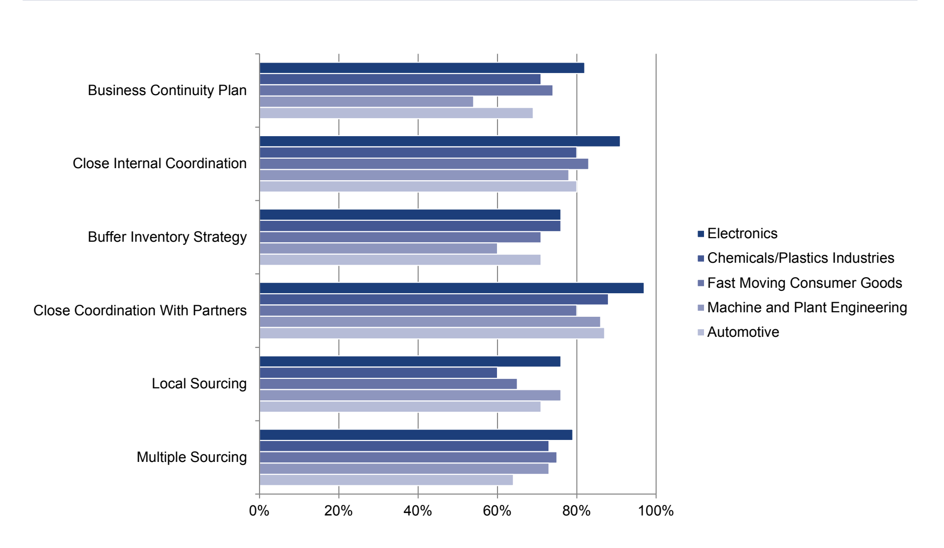


63 | Current and Five Year Trends in Electronics Industry (% Respondents)



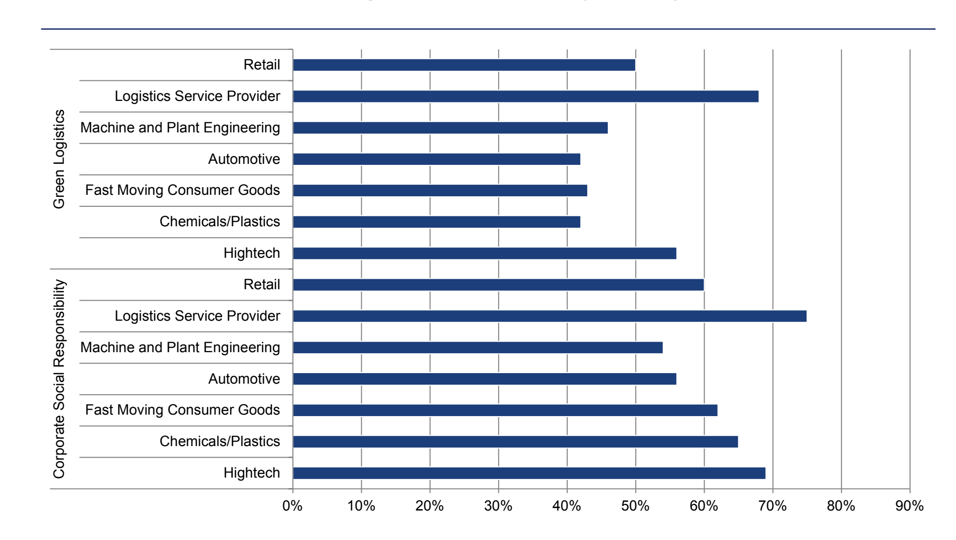
64 | Current and Five Year Trends in LSP Industry (% Respondents)

All industries are applying a set of different strategies to cope with disruptions. Electronics companies pursue such strategies more often than companies from other industries. A possible explanation might be that electronics products and supply chains are particularly complex and, thus, vulnerable to such disruptions. In general, coordinative strategies dominate.



65 | Current and Five Year Strategies For Disruptions by Industry (% Respondents)

Interestingly, logistics service providers turn out to be pioneers with respect to green logistics and corporate social responsibility as a part of their logistics strategies. This may be due to requirements by their customers. When comparing manufacturing firms, high-tech companies have integrated these strategies more extensively. As consumers are increasingly demanding green products, a large number of retailers have adopted green logistics.



66 | Green Logistics and CSR by Industry (% Respondents)

Bundesvereinigung Logistik (BVL)

Prof. Dr.-Ing. Raimund Klinkner
President
BVL International

Contact:
BVL International
Bundesvereinigung Logistik (BVL) e.V.
Schlachte 31, 28195 Bremen, Germany
Phone: +49 / 421 / 173 84 0
Fax: + 49 / 421 / 16 78 00
www.bvl.de

Founded in 1978, Bundesvereinigung Logistik is a nonprofit, non-affiliated and primarily honorary organization. It serves as an international platform for logistics managers from the top echelons of industry, trade and services who are all actively involved in logistics as well as scientists. Students and young professionals also play an important role in BVL and are organized in special student chapters in the various regions of Germany. Today, BVL has over 10,000 members. Through the events it organizes, its publications and its general activities geared towards providing information, BVL promotes interaction between specialists and generates stimuli for cross-sector, future-oriented logistics concepts. It is also active outside Germany and has set up international chapters in China (Hefei, Beijing and Shanghai), Turkey (Istanbul and Izmir), Moscow, Sao Paulo, Singapore and Tashkent. BVL's strong regional network provides forums for a meeting of expert minds and the exchange of experience in many locations. The some 280 regional, national and international events staged by BVL every year provide the ideal setting for interaction between logistics professionals. Events of international significance include in particular the International Supply Chain Conference, the Forum Automotive Logistics, the International Scientific Symposium on Logistics and Supply Chain Day, an annual day of action involving the entire industry. Members of the association and interested guests come together at these events to meet each other, obtain information and discuss key issues. BVL is a byword for a holistic logistics mindset, catering to the interests of logistics and supply chain management experts in industry, trade and the service sector.

Effective and rapid transfer of knowledge is facilitated not only by the chapters but also by a number of future-oriented focus groups. The studies initiated by BVL are a further instrument for the systematic analysis and promotion of logistics issues, and this is also why the association confers several awards in recognition of outstanding achievements in supply chain management: the German Award for SCM, the Supply Chain Sustainability Award, the Science Award for SCM, the Media Award for Logistics and the Thesis Award for degree, Bachelor and Master theses.

North Carolina State University

Robert Handfield, PhD
Bank of America University
Distinguished Professor
Director, Supply Chain Resource Cooperative
Poole College of Management
North Carolina State University

Contact:
Poole College of Management
North Carolina State University
Campus Box 7229
Raleigh, NC 27695-7229
Phone: +1 / 919 / 515 46 74
Fax: +1 / 919 / 515 69 43
www.scm.ncsu.edu
Blog: scm.ncsu.edu/blog

North Carolina State University's Supply Chain Resource Cooperative (SCRC) is a unique university-industry initiative that provides MBA and undergraduate students with opportunities to apply supply chain (SC) business curriculum theory and concepts to field-based projects over a 15-week semester. The SCRC is located in the Poole College of Management, in the Department of Business Management. Rather than focusing on how faculty research can be applied in industry, faculty integrate field-based student course projects with real problems that industry is facing. The field-based student projects are co-led by SCRC directors and faculty at the Poole College of Management, and professional SC managers at SCRC companies. There are currently 15 such supporting partners, with firms from manufacturing, financial services, pharmaceuticals, logistics, healthcare, energy, oil and gas, and chemicals. The SCRC organization and infrastructure focuses on improving the caliber and preparation of students to enter the SC management profession, and establishing thought-leadership in supply chain management through industry-focused collaborative research. This is accomplished through facilitating interaction between students, faculty and executives by bringing the classroom into industry and involving students to find viable solutions to real business problems. Since 2000, 1,251 students have completed over 400 projects with 45 companies. The SCRC is a self-funded, small business that is supported by donor companies. The organizational structure of the SCRC enables the team to develop and maintain long-term relationships with our donor companies, which is critical for a successful student-based outreach initiative with industry. The SCRC is an exemplary model for other universities who wish to further align with industry need for talent using field-based student project courses. The SRCR website is an open portal with a wealth of supply chain information. The SCRC also provides custom executive training.

Technische Universität Berlin

Prof. Dr.-Ing. Frank Straube
Director Department of Technology and Management, Chair of Logistics, Technische Universität Berlin
Member of the Advisory Board of BVL

Dr. Andreas Wieland
Manager of the Center for International Logistics Networks (funded by the Kühne Foundation) at the Chair of Logistics

Contact:
Technische Universität Berlin
Sekr. H 90
Straße des 17. Juni 135
10623 Berlin, Germany
Phone: +49 / 30 / 314 22 877
Fax: +49 / 30 / 314 25 992
www.logistik.tu-berlin.de

The Chair of Logistics at the Technische Universität Berlin offers a wide-ranging program comprising the four fields of teaching, research, executive training and services. It was founded in 1978 by Professor Helmut Baumgarten. The integrative approach based on a holistic view on end-to-end logistics systems and the innovative concepts pursued by the Chair with several lecturers, about 20 researchers and student assistants each has made it a highly reputed research partner for well-known companies in industry, retail and the service sector as well as for institutions. The teaching curriculum covers the entire spectrum of logistics. Students can register for both generalist and special-subject lectures and courses both at the bachelor's and master's level. The main demand for courses comes from students of Industrial Engineering and Management, but also from other study programs. Every year, up to 200 students from various countries take advantage of the faculty's wide-ranging teaching program. Close cooperation with international companies and institutions, as well as honorary professors and lectures from practice underpins the effective, practice-orientated educational concept, resulting in 80 degree theses on theoretical and practical topics each year. In addition, there is a strong international focus, realized by dual master programs (e.g. with China and France) and exchange programs. Education and training is supported by a high-end computer pool and software applications as well as the integrated logistics laboratory of the Chair. Research fields of the Chair include trends and strategies in logistics geared towards the successful identification and the transfer of best practice models, management strategies, technologies as well as environmental and resource protection in logistics. One of the long-term partners of the Chair of Logistics is the Swiss Kühne Foundation, which funds the Center for International Logistics Networks at the Chair. It covers topics such as the management of global value creation and international logistics.

Technische Universität Darmstadt

Prof. Dr. Dr. h.c. H.-Chr. Pfohl
Head of the Supply Chain and Network Management Group, Technische Universität Darmstadt

Contact:
Technische Universität Darmstadt
Hochschulstraße 1
64289 Darmstadt, Germany
Phone: +49 / 6151 / 16 42 77
Fax: +49 / 6151 / 16 65 03
www.scnm.tu-darmstadt.de

The Research Unit Supply Chain- and Networkmanagement (SCNM) does not only conduct basic research but also uses the findings of its applied research to support problem-solving processes in the day-to-day operations of companies. In this way, the SCNM-Unit consciously operates at the complex interface between research and practice.

The SCNM-Unit sees itself as a platform for theory-led and application-oriented research into problems in the fields of corporate management and logistics. Through its research activities, the SCNM-Unit aims to produce internationally recognized research findings in the areas of corporate management and logistics. To this end, the SCNM-Unit conducts research projects on national, European and global level. This research in the field of corporate management focuses on strategic and value-oriented management, international management, corporate networks and cooperation models. The key research topics in the area of logistics are supply chain management, supply chain finance, supply chain risk management, service innovations, city logistics, combined transport concepts and the implementation of the logistics idea. The scientific work of the SCNM-Unit is focused on the investigation and analysis of new developments as well as the derivation and communication of scientific knowledge and insights. The SCNM-Unit conducts basic and applied research projects as part of publicly funded programmes operated by bodies such as the German Research Foundation (DfG), the European Commission, the German Ministry of Transport, Construction and Urban Development and the German Ministry of Education and Research as well as on behalf of individual companies. The research projects are characterized by interdisciplinary cooperation with other research institutes and collaboration with industrial, trading and service companies. Close cooperation with companies in the field is designed both to stimulate research activities and to promote the transfer of research findings to these companies. The expertise and know-how of the SCNM-Unit is underpinned by wide-ranging experience in research, theory and practice at a sustained high level.





BVL International
Bundesvereinigung Logistik (BVL) e.V.
Schlachte 31, 28195 Bremen, Germany
Phone: +49 / 421 / 17 38 40
Fax: +49 / 421 / 16 78 00
bvl@bvl.de
www.bvl.de

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